

# THE LANCET

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LONDON, SATURDAY, AUGUST 19, 1871.

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THREEPENCE  
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**ROYAL GEOGRAPHICAL SOCIETY.**—Fellows and the Public are informed that the Offices and Collections of this Society will be CLOSED throughout the Month of AUGUST, on account of removal to the New Premises, No. 1, Saville-row. By Order, H. W. BATES, Assistant Secretary. 15, Whitehall-place.

## ANDERSON'S UNIVERSITY, GLASGOW.

**CHAIR OF NATURAL PHILOSOPHY.**  
The Trustees invite Candidates for the Chair of NATURAL PHILOSOPHY, Vacant by the Appointment of Professor HENCKS, to the Professorship of Experimental Philosophy in Durham University, in connection with the New College of Physical Science at Newcastle. Applications to be lodged on or before the 20th of August with the Secretary, who will furnish information regarding the duties and terms of the Appointment. J. B. KIDSTON, Secretary. 80, W. Regent-street, Glasgow, 20th July, 1871.  
Note.—The Trustees do not bind themselves to appoint any of the Applicants.

**UNIVERSITY COLLEGE, TORONTO.**—Applications will be received, up to September 6th, from Candidates for the Professorship of Natural History in this College. The initial Salary is £600, currency per annum, rising to £800, currency, by addition of 20s. currency, at intervals of five years. The applications, with Testimonials (Originals or Certified copies), are to be addressed to the Hon. M. C. CAMERON, Provincial Secretary, Toronto, Ontario, in Envelopes marked "Natural History," and should be posted so as to reach him on or before September 6th. The Academic Year will begin on October 2nd; and the commencement of the Lectures on Natural History may be deferred to the month of November. JOHN McCALL, LL.D., President. University College, Toronto, July 17, 1871.

**MIDDLESEX HOSPITAL.**—The WINTER SESSION for 1871-72 will be OPENED on MONDAY, October 2nd, at Three o'clock, with an Introductory Address by Dr. JOHN MURRAY.

**LECTURES FOR WINTER TERM.**  
Medicine.—Dr. Greenhow, F.R.S. Surgery.—Mr. De Morgan, F.R.S. Practical Surgery.—Mr. Hulke, F.R.S.; Mr. Lawson; Mr. Henry Morris. Physiology.—Mr. Lowrie. Anatomy.—Dr. M. Living, M.A. Cantab. Chemistry.—Mr. Hirsch. Pathological Anatomy.—Dr. Cayley. Anatomical Demonstrations.—Dr. Living, College Tutor.—Dr. Living. Consulting Physicians.—Dr. F. Hawkins; Dr. A. P. Stewart. Physician.—Dr. Goodfellow; Dr. Thompson; Dr. Greenhow, F.R.S. Obstetric Physician.—Dr. J. Hall Davis. Assistant Physicians.—Dr. K. Living, M.A. Cantab.; Dr. Cayley; Dr. John Murray. Consulting Surgeon.—Mr. Shaw. Surgeons.—Mr. De Morgan, F.R.S.; Mr. Nunn; Mr. Hulke, F.R.S. Ophthalmic Surgeon.—Mr. Hulke, F.R.S. Assistant Surgeon.—Mr. Lawson. Dental Surgeon.—Mr. Thomas, F.R.S. Assistant Dental Surgeon.—Mr. Turner.

The Hospital contains 800 beds; there are special departments for Cancer (30 beds), for Diseases of the Eye, Diseases of Women and Children, and Syphilis. Demonstrations are given during the Summer Session on Diseases of the Skin and the Use of the Laryngoscope. Three Clinical Prizes, including the Governors' Prize of twenty guineas, are awarded to those students who pass the most satisfactory examination at the bedside and in the post mortem room. Class Prizes are also given. There are likewise valuable rewards in the form of six Resident Clinical Appointments. Students can avail themselves, free of charge, of the assistance of the College Tutor, and thus avoid, when preparing for the examinations of the Licensing Boards, the necessity of any private teaching apart from that of the Medical School. General Fee—Attendance on the Hospital Practice and Lectures required by the Colleges of Physicians and Surgeons and the Society of Apothecaries, 80s., which may be paid by instalments. Fee for Dental Students, 25 guineas for the first year, and 15 guineas for the second.

One of the members of the staff receives Students to board with him. Further information may be obtained on application to the Treasurer, Dr. Greenhow; the Dean, Dr. Cayley; or to Mr. Lucas, the Resident Medical Officer, at the Hospital.

## ST. BARTHOLOMEW'S HOSPITAL and COLLEGE.

The WINTER SESSION will COMMENCE on MONDAY, OCT. 2. Students can reside within the Hospital Walls, subject to the College regulations. For all particulars concerning either the Hospital or College, application may be made, personally or by letter, to the Resident Warden of the College, or at the Museum or Library. A Handbook will be forwarded on application.

## ROYAL COLLEGES OF PHYSICIANS and SURGEONS OF EDINBURGH.

NOTICE is HEREBY GIVEN, that the PRELIMINARY EXAMINATIONS in GENERAL EDUCATION by the ROYAL COLLEGES OF PHYSICIANS and SURGEONS OF EDINBURGH, during the Session 1871-72, will be held on the following days, viz:—SATURDAY, the 21st October, and SATURDAY, the 4th November, 1871, and SATURDAY, the 20th April, and SATURDAY, the 2nd July, 1872. At Twelve o'clock, and on each occasion the Examination will be continued the following MONDAY, at One o'clock. The Examinations are held alternately at either College.

Intending Students of Medicine are reminded that they must pass the above Examination, or one of those recognized by the General Medical Council of Education and Registration, or equivalent to it, before they can be registered as Medical Students. Information as to the Subjects of Examination, Books prescribed, &c., may be obtained, on application, from the Office of either College.

D. R. HALDANE,  
Secy. Royal College of Physicians.  
JAMES SIMSON,  
Secy. Royal College of Surgeons.

## LONDON INTERNATIONAL EXHIBITION

of 1871. WILL CLOSE on the 30th of SEPTEMBER. The GENERAL PUBLIC are admitted EVERY WEEK-DAY, EXCEPT WEDNESDAY, from 10 A.M. to 5 P.M., on payment of ONE SHILLING. ON WEDNESDAYS the price is HALF-A-CROWN.

## ST. MARY'S HALL, Nos. 5 and 6, ST. MARY'S ROAD, CANONBURY, LONDON, N.

English and French Institution for Ladies, on the Principles of Queen's College (established 1840), will RE-OPEN (D.V.) on the 1st SEPTEMBER.

Ladies wishing further instruction in any branch of Education, under eminent Professors, can be received as BOARDERS, for a Term, or longer.—Prospectuses forwarded upon application. SARAH NORTHGOTT, Principal.

## CRYSTAL PALACE.—

SPECIAL ATTRACTIONS, NEXT WEEK.  
MONDAY.—German National Fête.  
TUESDAY.—Foresters' Great Fête.  
WEDNESDAY.—Fountain and Garden Fête.  
THURSDAY.—Mr. Perrin's Benefit—Blondin, Ballad Concert, Fireworks, &c.  
SATURDAY.—Special Attractions (see Daily Papers).  
The Fine Arts Courts and Collections, all the various Illustrations of Art, Science and Nature, and the Gardens and Park, always open. Music and Fountains Daily.  
Admission, Monday to Friday, One Shilling.—Saturday, Half-a-Crown, or by Guinea Season Ticket.

## THE UNIVERSITIES CLUB.

**Committee.**  
The Right Hon. the Lord Lytton, Trinity College, Cambridge.  
Barry, the Rev. Alfred, D.D., Principal of King's College, London.  
Ox, the Rev. E. N. M.A., Trinity College, Oxford.  
Cree, the Rev. E. D., Oriel College, Oxford.  
Dartmouth, S. D., Esq., M.A., Balliol College, Oxford.  
Geddes, G. W., Esq., M.A., Professor of Greek, University, Aberdeen.  
Jephson, the Rev. Wm., M.A., Corpus Christi College, Cambridge.  
Johnson, Professor George, M.D. London.  
Larive, J. S., Esq., M.D. Edinburgh; Hon. Fell. King's Coll. London.  
Macdon, the Rev. H. Victor, M.A., Trinity College, Cambridge.  
Paley, F. A., Esq., M.A., St. John's College, Cambridge.  
Pemberton, Edward Leigh, Esq., M.P. M.A., St. John's Coll. Oxford.  
Playfair, Lyon, Esq., M.P. C.B. D.C.L.  
Rumsey, the Rev. James, M.A., Pembroke College, Oxford.

The special attention of University and Public School Men is drawn to the establishment of this Club, the prominent object of which is to bring together in a London centre members of all the British Universities.

Members of Foreign Universities, of recognized Literary and Scientific Societies, and of the Learned Professions, are also eligible. The existing University Clubs are full, and Candidates have to wait for admission. The Club is situated at the St. James's street end of Jernyn-street, and has been secured on lease for 30 years.

The premises now in course of preparation will be ready for occupation in October. They are capable of accommodating from 1,200 to 1,500 members, and contain 20 available bed-rooms for members, a certain proportion of which will always be retained for the convenience of country members.

The financial year will commence from the 1st October next. The annual subscription will be six guineas, and the entrance fee ten guineas. A special privilege will, however, be accorded to members joining before the opening of the Club—they will be admitted for a first payment of ten guineas, to include the entrance fee and subscription for the first year.

The Club being proprietary, no pecuniary liability attaches to any member. All communications to be addressed to the Honorary Secretary, from whom forms of application for membership may be obtained. 71, Jernyn-street.

## CAMBRIDGE HOUSE, Albert-terrace, DOUGLAS, ISLE OF MAN.

TWO LADIES receive a few PUPILS to prepare for the Girls' Cambridge Examinations. They offer the following advantages: Residence, a large airy house in a quiet sea-side town, every domestic comfort; the hours of work, rest, and recreation so alternated as to ensure health with diligent study. Experience: the elder has acquired considerable reputation as a Teacher, the younger has passed two of the Examinations with credit. References to Parents of present and former Pupils.—Terms, for English, French, and Latin, 40 guineas. Fees paid quarterly in advance. No extras. No School Bill. Pupils provide Stationery and pay their own Laundry Expenses.

PUPILS RE-ASSEMBLE August 9th. Vacations at Midsummer and Christmas only.

## THE BEDFORDSHIRE MIDDLE-CLASS PUBLIC SCHOOL COMPANY (Limited).

Chairman—Earl Cowper, K.G.  
Vice-Chairman—Mr. Samuel Whitbread, M.P.  
HEAD MASTERSHIP.

In consequence of the lamented death of the Rev. William Grooms, M.A., the late Head Master, the Directors require a Head Master for the School. The School is situated in the parish of Kempston, adjoining the town of Bedford.

The School is fitted for 300 boarders, and is quite full. Candidates to communicate with the Secretary, and furnish copies of their Testimonials on or before the 15th of September next.

Candidates not more than 40 years of age will be preferred. Salary, 400s. per annum, and a Capitation-fee of 12s. for every boy over the number of 100. Residence free of rent, rates and taxes. Bedford, August 12, 1871. THOMAS W. TURNLEY, Secretary.

## HIGH-CLASS FINISHING SCHOOL, conducted by the Misses HITCHINS, 36, Queen's-garden, Hyde Park, W.

In addition to superior Governesses, English and Foreign, Fourteen of the First Professors attend.

The year of Study is divided into Terms. Arrangements are made to take the Daughters of Parents residing abroad to the Sea-side during the Summer Vacations.—The highest references are given.

## RAWDON HOUSE, EAST END, FORTIS GREEN, FINCHLEY.—THE PUPILS of this Establishment will RE-ASSEMBLE on THURSDAY, August 31st.

July 15th, 1871. HELEN TAYLOR.

## LADIES' COLLEGE, DUFFIELD HOUSE, LOWER NORWOOD, Surrey.

The AUTUMN TERM will COMMENCE (D.V.) the 15th of September. Fees, inclusive, 40, 60, and 100 guineas, according to Masters; the latter includes also Riding Lessons, and Season Ticket for Crystal Palace.—Address Mrs. or Miss RICHARDSON, as above.

## BEDFORD COLLEGE (for LADIES), 48 and 49, BEDFORD-SQUARE. Founded 1849. Incorporated 1869.

The SESSION 1871-72 will BEGIN THURSDAY, OCT. 12.

Two APOLO SCHOLARSHIPS, giving Free Admission for two years to Five Classes, will be OPEN for Competition, by Examination, at the beginning of NEXT OCTOBER. Candidates are requested to send their Names to the Secretary before September 1st.—Prospectuses, with particulars of Scholarships, Bursaries, &c., may be had at the College. JANE MARTINEAU, Hon. Sec.

## GROVE PARK PREPARATORY SCHOOL for YOUNG GENTLEMEN, 18, Grove Park-road, Chiswick, conducted by Mrs. TAYLOR. For terms, apply as above.

## ST. PETER'S COLLEGE, EATON-SQUARE, S.W.

Founded 1830. Incorporated 1871.  
PATRONS.  
Lord Archbishop of CANTERBURY.  
Lord HIGH CHANCELLOR.  
President—Lord WESTMINSTER.

The SCHOOL will RE-OPEN 12th September. Tuition-Fees, 12 to 15 Guineas a year, divided by three Terms. The Masters will receive BOARDERS.—Address Rev. R. GIBSON, M.A., Head Master. H. OWGAN, LL.D., Secretary.

## SEASIDE.—WATFORD HOUSE SCHOOL, FOLKESTONE near The Leas.

Principal—Mr. J. W. ROBERTS.  
A thorough Education and liberal Treatment. Sea-bathing. Preparation for Examination and Commercial Pursuits. Highest references.

MRS. BAYNES and her SISTERS, the Misses BEARD, late of Denmark Hill, are now residing in a large House, in the favourite suburb of HAMPESTEAD. Pupils RE-ASSEMBLE on September 7th.—Mount View, Greenhill, Hampstead.

## HILL SIDE, GODALMING, Surrey.—The Rev. E. S. DODD, M.A. (late Chaplain, &c., of Chesham School).

Boys under 15 prepared for Eton, Harrow, Charterhouse, &c. Terms, from 20 Guineas. Situation very healthy. For Prospectuses, address as above. The NEXT TERM begins SEPTEMBER 12.

## THE HARTLEY INSTITUTION, SOUTHAMPTON.

—The PROSPECTUS of the Departments of General Literature, Engineering and Technical Science, and Preliminary Medical Education, may be obtained on application to the PRINCIPAL.

## GERMAN EDUCATION.—Dr. PAUFLEDER, of LEIPZIG, receives into his Family YOUNG GENTLEMEN, from the Age of seven years and upwards, whose Parents are desirous of giving them a good German and General Education.—For References, Prospectuses, and further information, apply to Messrs. TAYLOR & Co., Paternoster-row, London; Ferdinand Dufour, 41, Old Broad-street, London; Liepmann, Lehmann & Co., Glasgow; Edward Nathan, Oldbury Lodge, Manchester; J. Phillips, Bradford, Yorkshire; Henry Heymann, Stoney-street, Nottingham.

## GERMANY.—YOUNG LADIES wishing for Improvement would find excellent Masters at Schwerin, the capital of Mecklenburg, where a Private Family offers the Comforts of Home with great Educational Advantages. Parents are received with their Daughters, if desired.—Address GERMANIA, 5, Sloane-street, Belgrave, London.

## TO INDIAN PARENTS and GUARDIANS.—A Married Lady (without children), residing in a very pretty part of Surrey, wishes to receive a FAMILY of YOUNG CHILDREN, who will have the most unending and tender care, and great educational advantages. The House is large, has warm, sunny rooms, and is in every way a suitable Home for Delicate Children. An Infant could be received, and the services of a valued Nurse devoted to it. As the Advertiser's principal object is to have the Children of ONE Family only to care for and educate, very high terms are not required.—Full particulars and most desirable References will be given on applying, by letter, to D. W. Messrs. Stanford, 6 and 7, Charing Cross.

## A LADY, residing in a healthy Watering-Place in the West of England, wishes to receive ONE or TWO LITTLE GIRLS to educate with her only Daughter, under a first-rate Governess and Masters. Good References.—Address L. A. B. Rother's Library, Weston-super-Mare.

## TO PRINCIPALS of SCHOOLS.—MATRON and HOUSEKEEPER.—A Lady, who has had many years' practical experience, desires to make another ENGAGEMENT, where active and energetic services would be appreciated. Unexceptionable testimonials.—Address E. A., Bickers & Son, 1, Leicester-square, W.C.

## A CLERGYMAN'S WIDOW wishes to recommend a GERMAN LADY, of a noble Family in Hanover, having resided many years in England, and having had great experience in Tuition, desirous of receiving into her comfortable home, situated in the best part of the town, a few English Pupils. Terms, for Board and Instruction, inclusive of Boarding Expenses, are 40 guineas. First-class Music and Drawing extra.—For particulars, address N. V. S., Post-office, Stourbridge.

## EDUCATION.—SEA-SIDE, SUSSEX.—The late Principal (Married) of a Public School, in connexion with the London University, receives PUPILS and BOARDERS at his Residence, and prepares for Public Schools, Universities, and various Military and Civil Service Examinations.—For terms, references, &c., address C. H. Messrs. Hatchard & Co., 17, Piccadilly, W.

## EDUCATION.—A CLERGYMAN desires to receive One or Two Young Gentlemen as COMPANION PUPILS to another now with him. Healthful locality; nice neighbourhood. Careful preparation for Professional or Commercial Life. Terms strictly moderate.—Address Mr. DEBENHAM, 73, Ship-street, Brighton.

## THE REV. G. HENSLOW, M.A. F.L.S. F.G.S., VICE-PRINCIPAL in Botany at St. Bartholomew's Hospital, gives PRIVATE INSTRUCTION in GEOLOGY, PHYSICAL GEOGRAPHY, MINERALOGY, and BOTANY.

M. FORTUN of the 30 successful Candidates for the India Civil Service (1871), as well as several of the year 1870, were prepared by him in those Subjects, besides many of the non-successful.

The Rev. G. H.'s Lectures are well illustrated by the Collections and Diagrams of the late Professor Henslow and Braxley (of the London Institution).—17, Colville-terrace West, Notting-hill, W.

## MATHEMATICS and PHYSICS.—Mr. F. HUMPHREY, B.A., late Junior Student of Christ Church, Oxford.

First Master in Mathematics and Natural Science, RECEIVES A FEW PUPILS in a Country House, and prepares them for the Universities and the Scientific Professions.—For terms and further particulars apply to Mr. F. H. HUMPHREY, Elmore, Newbury, Berks.

## SIGNOR ENRICO BELLI, ARTIST, Copyist to Her Majesty, begs to inform the Amateurs of Art, that, being obliged to go to India, he is desirous of DISPOSING OF (for a third of their value) several FANCY PICTURES of his own Composition; also some Copies of Old Masters (painted by the great "Aurora," "Cenci," "St. Michael," &c. after Guido, and others after Correggio, Guercino, &c. at prices varying from 1s. to 40s.—172, Hampstead-road (four doors from Harrington-square), London, N.W.

**KING'S COLLEGE, London.**—The THEOLOGICAL DEPARTMENT.—New Students must present themselves on TUESDAY, October 3.

The College Theological Testament can be obtained by  
A. Graduates in Arts of any British University, in three terms.  
B. Associates of the Gen. Lit. Dep. of King's College, in six terms.  
C. All duly qualified persons of 21 years of age, in six terms.  
Two Studentships of the value of 300. for two years will be adjudged by examination to those entering the College in October next.  
There is also a Preparatory Class for those wishing to pass the Entrance Examination.  
For information apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**KING'S COLLEGE, London.**—DEPARTMENT OF GENERAL LITERATURE AND SCIENCE.—New Students will be admitted on TUESDAY, October 3.

The Department is thus divided:—  
I. The Classical Division (embracing Classics, Mathematics, English History, and Modern Languages).  
II. The Modern Division, which provides a system of Liberal Education, including English, Latin, Modern Languages, Mathematics, Natural Philosophy, Chemistry, Geology, and Free-hand Drawing.  
For information apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**KING'S COLLEGE, London.**—DEPARTMENT OF APPLIED SCIENCES.—New Students will be admitted on TUESDAY, October 3.

The Course of Study provides a System of practical Education for Young Men who intend to engage in Engineering, Surveying, Architecture, and the higher branches of Chemical and Manufacturing Art. This Department is attached to it a Workshop, also Chemical, Physical, and Photographic Laboratories.  
Two Exhibitions of 500. and 250. will be given at the commencement of the Michaelmas Term, by Competitive Examination amongst the Students matriculating at that time. The subjects of Examination will be Arithmetic, Algebra, Geometry, Trigonometry, and Mathematics applied to Mechanics.  
For information apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**KING'S COLLEGE, London.**—The EVENING CLASSES.—These classes will RE-OPEN on MONDAY, Oct. 9, in Divinity, Latin, Greek, French, German, Hebrew, Italian, Spanish, English, History, Geography, Arithmetic, Writing, Mathematics, Commerce, Drawing, Chemistry, Practical Chemistry, Mechanics, Physiology, Physics, Zoology, Logic, Political Economy, Mineralogy, Geology, Law, and Public Speaking.

For the Prospectus apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**KING'S COLLEGE, London.**—The SCHOOL.—New Pupils will be admitted on TUESDAY, Sept. 19. There are three Divisions:—

1. Division of Classics, Mathematics, and General Literature, which is intended to prepare Pupils for the Universities, for the Theological, General Literature, and Medical Departments of the College, and for the Learned Professions.

2. Division of Modern Instruction is intended to prepare Pupils for General and Mercantile Pursuits, for the Department of Engineering and Architecture in the College, and for the Military Academies.

3. Lower School.—This Division includes Boys over Eight Years of Age, and is intended to give a complete Course of Education up to such a point as will prepare them to enter with advantage either of the two Senior Divisions.  
For information apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**KING'S COLLEGE, London.**—MEDICAL DEPARTMENT.—The WINTER SESSION will OPEN on MONDAY, Oct. 2, with an Introductory Lecture by Dr. RUTHERFORD.

Warneford Scholarships.—Students entering the Medical Department of this College in October next, will have the exclusive privilege of contending for two Scholarships of 250. each for three years. These Scholarships are given for proficiency in Divinity, Classics, Mathematics, History, and Modern Languages. The subjects may be obtained from the Secretary.

Five Medical Scholarships are awarded at the close of each Winter Session for proficiency in Professional Subjects—viz., one of 400. for two years; one of 200. for one year; and three of 50. for one year.  
For further information apply personally, or by postage-card, to J. W. CUNNINGHAM, Esq., Secretary.

**PRIVATE TUITION.**—The HIGHLANDS.—An English Clergyman, Honour Graduate of Trinity, Cambridge, will RECEIVE FREE or FOUR PUPILS to EDUCATE, or prepare for the Universities, &c.—Address Rev. E. W. C. Birnam, N.E.

**PRIVATE PUPILS IN WEST LONDON.**—A Public School Man and Graduate in Honour of the University of Oxford; late Scholar of Oriel, and Royal Exhibitor of the Government School of Mines, RECEIVES PUPILS at his Chambers.—Classics, High Mathematics, Physical and Mental Science.—Address Rev. B. A., 29, Great Marlborough-street, W.

**BOARD AND RESIDENCE** is offered to One or Two GENTLEMEN, in the well-furnished house of a Lady of high respectability, residing near South Kensington. Terms, 25s. a week; Dinner, Half-past Six.—Address R.R., Post-office, Gloucester-road, Hereford-square, S.W.

**THE EXACT SCIENCES.**—Any Gentleman, with a thorough knowledge of the Exact Sciences, who would be willing to devote a few hours a week to READING the three first volumes of Auguste Comte's 'Positive Philosophy' with a Gentleman residing at Brighton, is requested to communicate, stating qualifications, with A. B. C., Branch Post-office, Kemp Town, Brighton.

**DEGREES, M.A., Ph.D., &c.**—The Foreign Secretary to a well-known University is willing to interest himself in behalf of qualified Candidates for Honorary or other Academic Degrees. Fees nominal.—Address, in confidence, THE FOREIGN SECRETARY, 10, St. Paul's-road, Canonbury, London.

**A LIBRARIAN** wishes profitably to EMPLOY his VACATION.—Address, by letter only, ENEROY, Messrs. J. M. Johnson & Sons, 6, Castle-street, Holborn.

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Fifteen Volumes are allowed to Country, and Ten to Town Members. Reading-room open from Ten to half-past Six. Prospectus on application. CATALOGUE, 15s. to Members, 10s. 6d.

ROBERT HARRISON, Secretary and Librarian.

**THE UNITED LIBRARIES, 307, Regent-street, W.**—Subscriptions from One Guinea to any amount, according to the supply required. All the best New Books, English, French, and German, immediately on publication. Prospectuses, with List of New Publications, gratis and post free.—\* \* A Clearance Catalogue of Surplus Books offered for Sale at greatly reduced prices may also be had, free, on application.—BOOTH'S, CURATORS, a, Hogsden's, and RICHMOND & ORLEY'S United Libraries, 307, Regent-street, near the Polytechnic.

**THE ST. JAMES'S LIBRARY COMPANY, LIMITED, 20, Marlborough-street, Regent-street, London, W.** (near the Circus). New Company, established for the circulation of the best Works in all Departments of Literature. A full supply of all the most recent books. Subscriptions from 10s. 6d. per annum.—Prospectuses and Lists of Deposits and Books gratis and post-free on application to the Librarian.

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**PRESS.**—A Gentleman, possessing unexceptionable Testimonials as to Literary Ability, is at leisure to Contribute LEADING ARTICLES and LONDON LETTERS to Country Journals. Advertiser is on the London Press.—Address JUNIUS, Mitchell & Co., Red Lion-court, Fleet-street.

**THE PRESS.**—A REPORTER, of several years' experience, desires an ENGAGEMENT. Good references as to ability and character.—Deacon's, Leadenhall-street, London, A. Z. 2.

**REPORTER.**—A Verbatim REPORTER, with several years' experience, seeks a RE-ENGAGEMENT on a Weekly Journal.—Address A. B., Albert-street, Slough, Bucks.

**THE PRESS.**—WANTED, A GENTLEMAN to take CHARGE of the REPORTING STAFF of a first-class Daily Paper in Liverpool.—Address, stating qualifications, references, age, and salary expected, X 1, the Albion Office, Liverpool.

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LONDON, SATURDAY, AUGUST 19, 1871.

## LITERATURE

*The Dictionary of Biographical Reference.* By Lawrence B. Phillips. (Low & Co.)

A YEAR ago (*Athen.* No. 2233) we took occasion to observe upon the exuberant growth of biographical cyclopædias, their inconvenient bulk, their needless diffuseness, and the absolute necessity that existed for their producers adopting a more rigorous system of compression, a more succinct method of record than had hitherto obtained. "Biographies," we wrote, "will be required to assume the merest skeleton form, to the end that they may be contained somehow within the covers. Information will be pared as closely as possible, and opinion will have to be withheld almost wholly, and we may thus obtain a dictionary of more real worth to the student than any existing work. It would register a few prominent dates and facts, and would then refer him to the sources from which of a certainty further knowledge could be derived. That biographical dictionaries as at present constituted rarely avow the authority for the statements they contain, is a serious defect. . . . To give the student some precise information and to put him on the right track for finding more, and of the most complete kind, would be a task fairly within the scheme of a book of reference, and would invest it with peculiar value," and so on.

Mr. Lawrence B. Phillips has been occupied some six years, as he states, in compiling a 'Dictionary of Biographical Reference,' "the chief features of which are conciseness, comprehensiveness, and, what cannot fail to be appreciated by men of letters, copiousness of references to the principal standard books, where further information can be derived"; and he quotes at length our remarks as the most convenient way of illustrating the principle upon which his work is based. He has avowedly aimed at the production of a "Student's Dictionary of Biography." We should rather describe his book as a convenient Key to existing Biographical Encyclopædias, many of which are necessarily so voluminous and costly that they are confined mainly to the libraries of the wealthier classes, or of public institutions. Mr. Phillips, in fact, presents himself to the general public as a sort of biographical guide and assistant, pretending less to satisfy the inquirer than to indicate the quarter in which he may satisfy himself. His plan has been to digest the contents of some twenty-six works of general biographical reference, and some sixteen dictionaries devoted to class or special biography. His book professes to contain 100,000 names, or nearly four times the number of entries in the 'Nouvelle Biographie Universelle,' brought down to the year 1866, and published in forty-six volumes, by Didot Frères. The information afforded is, of course, very closely packed, rarely occupying, indeed, more than a line of print; so that altogether the book wears something of the aspect of a Post-Office Directory. Still, room is found for the name at full length of the personage registered, the dates of his birth and death, a statement of his dignity, profession or calling, with initial letters added, referring to the established works, in which further particulars may be sought.

The work, so far as it can be tested by the random selection and examination here and there of "sample cases," and, judged with due regard for the conditions the compiler has prescribed to himself, appears to be well and carefully executed. Space has been ingeniously economized, the promised information is concisely conveyed, and altogether a really useful book has resulted from Mr. Phillips's labours. At the same time, it may be suggested that the compiler's plan suffers occasionally from its limitations, or would be benefited if these were now and then rather less rigorously insisted on. The student is referred to the notices given in the elder dictionaries, upon the understanding that these "generally mention the larger works from which the information is taken." This is not invariably the case, however, and even if it were, the student would have been much assisted if it had fallen within Mr. Phillips's scheme to supply, as a rule, information of this kind at first hand. To take a familiar instance: the record of "James Henry Leigh Hunt: English poet and essayist; 1784—1859," is followed by reference to Didot, Vapereau, Walford's 'Men of the Time' (in which, by the way, the name does not appear, the work dealing only with the living), and Michaud's 'Biographie Universelle.' But the best authority for the facts of Leigh Hunt's life is surely his own admirable Autobiography, and the most convenient course would have been, under the circumstances, the bringing of that publication directly under the notice of the reader. In the same way the inquirer concerning the late Lord George Bentinck is referred, not to Mr. Disraeli's famous Life of that nobleman, but to the notice of him contained in Didot's 'Nouvelle Biographie Universelle.' Indeed, in regard to Mr. Disraeli himself, we are bidden to refer to no work dealing exclusively with his career, — though such a publication certainly exists, — but, as in the case of Leigh Hunt, to Didot, Vapereau, Walford, and Michaud. We are required continually to bear in mind that Mr. Phillips's book has little individual foundation, but is as a kind of "lean-to," its security dependent upon the soundness of preceding fabrics and unrelated labours.

How far the compiler may be justified in preferring foreign to native dictionaries of biography it is not necessary here to consider. We may note, however, that there is something curious in the frequent reference to French Cyclopædias as the best authorities for information regarding the lives of illustrious Englishmen. Is the most correct account of our present Prime Minister, for instance, really to be read in a foreign tongue? Has the lexicographer's art so completely declined amongst us? Are we altogether distanced, even in dealing with home affairs of this kind, by that faculty for organizing and marshalling information and facts which has long been a famous possession of continental authorities? Certainly, in comparison with Vapereau, 'Men of the Time' is but an inept production, while Nagler's 'Künstler-Lexicon' is, without doubt, a far more trustworthy work than Bryant's 'Dictionary of Painters.' We have no such work as the 'Biographie Universelle des Musiciens' of M. Fétis, and we owe to America the most complete dictionary of English writers. Upon recent English dictionaries of general biography Mr. Phillips

apparently places little reliance. He is content with 'Chalmers' of 1812-17, and the 1848 edition of 'Rose,' overlooking the more recent 'Imperial Dictionary of Biography,' and the revised 'English Cyclopædia of Biography,' reproduced from the *Penny Cyclopædia* of five-and-twenty years ago. Nor has he a word to say for the biographical entries in the last issue of the *Encyclopædia Britannica*. Without stopping to impugn Mr. Phillips's judgment in this matter, it is as well that note should be taken of it.

It is probable that the number of names assembled by the compiler may be in excess of general requirements on the subject, and he is open to the charge, often levelled against the writer of biographical dictionaries, of having pressed into his service various recruits of inferior constitution and inadequate stature. But the task of selection and rejection in such respect is one of some difficulty. One man's pigmies are another man's giants, and the compiler of works of the class is bound to distribute fame and to recognize distinction after a very liberal fashion indeed, so that satisfaction may be conferred upon as large a constituency as possible. It would seem, however, that, with the view, perhaps, of obtaining favour for his book across the Atlantic, Mr. Phillips has registered the names of numerous American citizens, whose reputations can scarcely be said to be of a universal kind. We are involuntarily reminded of the "most remarkable men" who so incessantly came under the notice of Martin Chuzzlewit on his journey towards the Eden settlement. In future editions Mr. Phillips will find it advisable to thin and weed his collection of notable names, even at the risk of reducing these below his standard number of 100,000. At present his congregation of famous persons has something of the quality of a paper army. And he will do well to consider how far it is expedient to register the names of the merely infamous, and to seek for celebrities in the pages of the Newgate Calendar. It is unfortunately true that our biographical dictionaries must be much extended in size if our criminals are to find record in them; and an unpleasant appraisal of crime will be necessitated. How deeply must a man sin to obtain biographical distinction? High treason, perhaps, followed by capital punishment, is an acceptable plea for remembrance, and so the name of Arthur Thistlewood, admitted to Mr. Phillips's book, may perhaps pass without question. But room is also found for Thurtell and Palmer; why not then for Courvoisier, the Mannings, and a host of other murderers? Upon what principle is the guilt of these wretches to be differentiated? It is to be dreaded that notice of one logically involves enumeration of all. And so with Fauntleroy. There have been forgers since Fauntleroy, who have sinned in no less degree. He is registered, why should they be omitted? Distinctions are, no doubt, hard to draw in this matter, but it may be commended to the compiler's notice that a marked difference exists between crimes against the state and crimes against the individual, and upon this may be founded a broad rule governing the admission of the names of criminal persons to a book of biographical reference.

In conclusion, we may note that Mr. Phillips has written an interesting Preface to

his work, descriptive of certain of the difficulties attending it, especially in relation to the change of style, the different dates of its adoption by the countries of Europe, and its perplexing effects upon biographical accuracy. Reference is also made to the confusion arising from the old practice of dating the year from the 25th of March, which has led many writers astray, and was only determined in England in 1752 by the same Act of Parliament which enforced the adoption of the new style. Further, the volume, which is of handsome appearance and clear type, is enriched by an Index of the principal works on Biography, published in Europe and America up to the present time, arranged under three divisions, general, national, and class. This list is capable of extension, but it has been prepared and arranged with considerable painstaking, and contributes to the value of a work which is unquestionably entitled to count upon the favour and support of a large public.

*Curiosities of Street Literature in China: a Lecture.* By W. H. Medhurst. (Shanghai.)

ALL designations in Chinese have a special and characteristic meaning. The country itself is "The Central Kingdom," "The Flowery Land," "The Heaven-canopied." The ancient and modern capitals are the northern *Pé*- and the southern *Nan-King* (metropolis). All the names of the provinces denote some particular distinction. *Kwantung* is the Broad East; *Kwansi*, the Broad West; *Honan*, South of the River; *Hupé*, North of the Lakes; *Shantung*, East of the Hills. Every street of every town has a name with a sense attached to it,—every emperor a title which conveys an idea to a Chinese eye or ear,—*Taou-Kwang*, Light of Reason; *Hienfung*, Enduring Felicity. Few things are more instructive than the signboards which ornament the shops in China. Every man seeks to out-do his neighbour in the attractiveness of his decorative invitations; and "no two prices" is a common announcement, to prevent haggling or bargaining.

Mr. Medhurst takes us to the main street in Ningpo, and points out to us a remarkable sign, at the entrance of a *restaurant*, which runs—"Limitless production! Feasts prepared both in the Tatar and Chinese style. The delicacies of the season. Sea-slugs smothered in Vermicelli, and trimmed with finely-shred ham. Forced meat, puffs," &c. This is the domestic *menu*; the opposite side announces, in equally glaring characters, "Delicacies from beyond the seas"; while a smaller signboard says that "*Tête-à-tête* meals are provided to the fancy of the guests"; and there is a farther notification, that "Famous wine from over the seas" is also to be had on application. "Each of these signs has a band of scarlet silk flaunting loosely from the handle,—a token that the shop has lately been established or enlarged, or that some accession of business or capital has accrued to the firm,—scarlet being the festive colour in China. Not unfrequently coarse white cotton or hemp cloth is similarly mounted—a sign that death has invaded the establishment, white being the colour of mourning." A silk-mercant's sign was—"We possess our own country agencies, where selection is made for the market of the finest sorts of silk, in the manipulation of which neither time nor labour is spared. We manu-

facture every sort of rich and pure silk, thread and floss-silk, silk for bow-strings, tassels, and cords; we give ourselves especially to the weaving and plaiting of parti-coloured girdles, and fittings of court caps in the newest Peking style. We also make fringes for caps, handkerchiefs of all kinds, damask, or crape, headbands, and collars of satin or gauze." Here is another advertisement, put forth by a druggist, who invites the public to swallow "Pills manufactured out of a whole stag, slaughtered with purity of purpose, on a propitious day." The wealthy, wholesale druggists are in the habit of purchasing large and handsome stags, which they expose in a pen at the door of the shop until "a propitious day" is selected for the animal's conversion into pills, when he is deliberately pounded entire into a pulp, from which pills are made. Another doctor styles himself "a world's benefactor," and professes to be accessible at home only on the even days of the month, and then only at 8 A.M. His afternoons he apparently gives up to ambulatory practice within the city.

Visiting is made a most serious business in China, and every individual of respectability must have a servant to carry and present his cards. A Chinese card is not a white, glazed little bit of pasteboard, but a huge sheet of scarlet paper, with the name inscribed in large characters: the more mammoth-like the character, the more grand and respectable it is. Cards are of several kinds. There is the plain card, a single sheet of scarlet paper, with the name written or stamped nearest the right hand and topmost sides. This is employed on common occasions. Then there is the official card, mostly used by mandarins on visits of ceremony. This is also a single sheet, and it contains the name, preceded by the entire title, written down the centre from top to bottom. Then, again, there is the full card, which is only produced on very grand occasions, such as New Year visits, visits of congratulation or condolence. The full card is folded, and must contain ten folds. It does not give titles, but simply contains the name of the individual written in the right hand and bottom corner of the first fold, prefixed by the words "Your stupid younger brother," and followed by the words, "bows his head and pays his respects." Where the person visited belongs to a generation senior to the visitor, the latter styles himself, "Your stupid nephew." If to two generations senior, the visitor writes, "Your more than stupid nephew." Should the individual visited belong to a younger generation, the visitor takes to himself the name of "uncle," instead of "nephew," retaining, however, the depreciatory appellation of "stupid." There are still further varieties of self-designation, according to the particular gradations of relationship; but those we have quoted will suffice to give an idea of the punctilious rules peculiar to Chinese visiting. We may add that the card last described is, as a matter of etiquette, always understood to be returned to the visitor; it being, presumably, expensive to leave such voluminous proofs of regard with a number of friends.

*Apropos* of cards, the most extraordinary one which Mr. Medhurst ever received from a Chinese was that of a lady giving him notice that she intended committing suicide at a specified date. She was young, attractive, and wealthy. Unfortunately her betrothed

died just before the nuptials, and she gave out that she deemed it her duty not merely to regard herself as perpetually widowed (a sacrifice considered as highly meritorious in China), but to die with her affianced husband; she therefore sent cards round to all her friends, intimating the intention alluded to. No attempt was made by her relatives, or by the local authorities to frustrate her design; the general opinion, on the contrary, being that she was about to perform a most praiseworthy act. On appealing to the mandarins, they assured Mr. Medhurst that in deference to popular prejudice, they must abstain from interference. Eventually, on the day indicated, she did deliberately sacrifice her life in the presence of thousands. A stage was erected in the open fields, with a frame over it, from which was suspended a strip of scarlet crape. One end of this she adjusted over her neck, she let fall a veil of similar material over her face, and, mounting a chair, jumped off it, her little hands "*chin-chinning*" the assemblage, as her fast falling frame twirled round with the tightening cord.

The apparel of the Chinese is constantly to be seen decorated with the written character. It is observable principally on the large cuffs attached to the sleeves of the females, on their little shoes, on children's clothes, on the tobacco-pouches and fan-cases of the men, and on the ends of their girdles. By far the prettiest instance of this conceit is, in our opinion, the baby-cap everywhere noticeable upon the heads of respectably dressed children. Here are two specimens: on the one is the inscription, "Long life, wealth, and honour;" on the other the sentence, "A safe passage through all critical periods and obnoxious influences."

*Select Poems from Dryden.* Edited by W. D. Christie, M.A. (Oxford, Clarendon Press Series.)

READERS of Sir Walter Scott's 'Pirate' must all remember good-humoured Claud Halcro, and his quotations from "glorious John." If anything could have added to his felicity, it would have been the satisfaction of always carrying about in his pocket the present handy edition of his favourite author's chief poems, by Mr. Christie. The poems selected are the following, viz., 'Stanzas on the Death of Oliver Cromwell,' 'Astræa Redux,' 'Annus Mirabilis,' 'Absalom and Achitophel,' 'Religio Laici,' and 'The Hind and the Panther.' Besides which, we have a biographical Introduction of sixty pages, some good notes, and a convenient glossary. The whole volume is exceedingly satisfactory. Mr. Christie has edited the works of Dryden so recently, in the "Globe" edition, that his Introduction is necessarily, to a considerable extent, a repetition of what he has told us before; but it is none the worse on that account. The best point about the book is, that the text has been very carefully revised throughout, for such revision was really necessary. The edition of Sir Walter Scott has been, in the "Globe" edition, corrected in a hundred instances; and, within the compass of the smaller volume, in forty instances. An editor who so carefully restores his text is entitled to our best thanks. A few points in the notes may be remarked upon. In st. 18 of the 'Annus Mirabilis,' we are told that *mien* was pronounced *mine* to rhyme with *shine*.



What would Mr. Ellis say to this? We suspect that he would reverse this decision, and contrive the rhyme by pronouncing *shine* as *sheen*. Elsewhere, we are told that *sea* was pronounced *say*; but it might be added, that this is common even in Pope, and it is worth notice that in Cowper's celebrated 'Alexander Selkirk,' the famous line, "I am monarch of all I survey," prepares us for the rhyme *sea* (*say*) in like manner, if we are to have a rhyme at all. We demur to the statement, on page 258, that "*atone* was also spelt *attone*, the two *t's* coming from the old spelling of *at* with two *t's*"; for we have never seen *att*, and the spelling *atte*, which does occur, is very faulty, except in cases where it is an abbreviation of *at the*. Surely, the two *t's* come from the fact that *one* was often written *tone*; thus, *the ton* and *the tother* (corruptions of *that one* and *that other*) were often written for the *one* and the *other*; indeed, *the tother* is still used colloquially. Hence *attone* is for *at tone*, the common derivation of *atone* from *at one* being perfectly correct. At page 268, the note on the line—

'Twere worth both Testaments and cast in the Creed, is that it is a clumsy line, and to be read by accenting the *a* in *Testaments*, as we do in *testator*. But this only makes the clumsy line still clumsier, and suggests feats of pronunciation to which few jaws are equal. The proper way is to *leave out* the *a* in *Testaments*, and to remember that the accent is not on *cast*, but on *in*, just as when we talk of "giving a man a thing *in*." We should therefore read it thus:—

'Twere wóth both Tést'ments, ánd cast in the Créed.

For the old belief about the sweetness of the panther's breath Mr. Christie rightly refers us to Pliny. It may be added, that it is worth while to compare with this the description of the panther in the old French and English bestiaries, which contain the same notion. Thus, in the *Bestiary* by Philip de Thuan, printed in Wright's 'Popular Treatises on Science,' we find (at page 83) that "the panther shows the life of the Son of St. Mary," that "by the smell we understand holy prayer," and that its cry shows "celestial voice." There is also an Anglo-Saxon description of the panther, in the *Codex Exoniensis*, closely resembling that by Philip de Thuan. The "old superstition" about the wolf (p. 276) is doubtless connected with the extraordinary belief in werewolves, on which Mr. Baring-Gould has written a monograph. Mr. Christie's careful use of headlines, by which the reader knows at once to what part of the work the notes refer, deserves to be imitated in all the books published in the "Clarendon Press Series." We can confidently recommend Mr. Christie's book, which seems excellent at all points. There is one singular misprint at p. 275, where the old romance of Gawain and Gologros is referred to as "Gavan and Gob."

Dryden deserves to be more widely read than perhaps he has been. There is a manly ring about his lines, which is more pleasing than the carefully-adjusted melody of Pope, whom Mr. Elwin is now editing so mercilessly. We hope, therefore, that Mr. Christie's volume will do something towards increasing the number of admirers of "glorious John."

*Christianity and Positivism. A Series of Lectures to the Times on Natural Theology and Apologetics.* By James M'Cosh, D.D. (Macmillan & Co.)

THESE Lectures were delivered at the Union Theological Seminary in New York, on the foundation established by Mr. Zebulon Stiles Ely, who left a sum of ten thousand dollars as an endowment for the defence of Natural and Revealed Religion. They betray their origin in their popular and rather superficial character, which is in striking contrast to the thoughtfulness and solidity of Dr. M'Cosh's other writings. It is evident that they were composed at the request of others, and not from an internal impulse to defend a cause dear to the writer's heart. Their range is too wide to admit of any portion of their subject being carefully treated. They hurry us through the argument from Design, the Darwinian theory, Protoplasm, Final Causes, and the objections brought against them,—Positivism, Materialism, the Nature of God, the Growth of Rationalism in America, the Authenticity of the Fourth Gospel, the 'Vie de Jésus' of M. Renan, and the mythical theory of the Origin of Christianity,—and they conclude with a quasi-historical sketch of the rise of the Christian Church, and its present position. Their author seems to be himself conscious of their defects, and candidly acknowledges that he has "traversed in too rapid a manner the worlds of mind and of matter." It would have been well if he had confined himself to something less ambitious, and had not attempted to refute almost all the leading philosophical and religious systems of the day in a work of some 350 pages.

This comprehensive system of controversy is fraught with many dangers to the cause which it upholds. If the reader is familiar with the doctrines impugned, he too often finds that they are not really overthrown by the orthodox controversialist, who has not, perhaps, a sufficient knowledge or ability to be able to grasp the position of his opponent, or to comprehend its strength; and therefore resorts to arguments which practically leave it untouched. This is especially the case when a theologian advances to defend Christianity against the attacks of scientific men; he may be entirely in the right as regards the basis of his own beliefs, but in most cases he undervalues the amount of probable evidence in favour of the hypothesis he is attacking. Sometimes he misrepresents it altogether, and attempts to bring ridicule upon it by inserting into it what its author would be most anxious to disclaim, or by drawing conclusions from it which are not justified by the premisses laid down. Thus the cause of Christianity is injured by the very means which are meant to support it, because men naturally judge of the strength of a theory from the strength of the arguments employed in its defence. In some respects Dr. M'Cosh's Lectures are a favourable exception to this style of controversy. He is a man of too much general culture and breadth of view to be ignorant of the power of those who are opposed to him; he allows the force of many of their conclusions and the value of the inductions on which they are based. He is fully aware of the sceptical tendency of many of the so-called orthodox arguments and protests, with especial earnestness against Dr. Mansel's

application of the doctrine of the Relativity of Knowledge in his Bampton Lectures to the defence of religion, natural and revealed. "Dr. Mansel," he says, "thought to employ it to undermine Rationalism; but in doing so he undermined as well the ground on which religion stands,—some one describes him as going out with a scythe to cut off the legs of others, and succeeding in cutting off his own legs" (p. 119). But yet we cannot altogether acquit Dr. M'Cosh of the ordinary defects of the controversialist, and we find in these Lectures many statements which the authors to whom they are attributed would either deny altogether or very easily defend against Dr. M'Cosh's attack. For instance, he bestows the name of "open rabid Atheist" on M. Comte, who distinctly and pointedly denied the charge, and refused to make any assertion respecting the existence or non-existence of the Divine Being. We strongly suspect that Dr. M'Cosh has never read the 'Philosophie Positive' and that his acquaintance with it is derived from its enemies or its critics, for he speaks of it with a superficial contempt, which can only arise from ignorance. Nor is he more successful in dealing with Materialism: he meets conclusions which are at least extremely probable, with assertions which appeal directly to consciousness, forgetting that the Materialist would not allow its authority. He tells his listeners that such men as Büchner and Cabanis are "scarcely worthy of being noticed before such an audience as this, for their enormous fallacies will at once be seen." He does not seem aware that the Materialist regards the spiritual world not as impossible, but as a perfectly unnecessary hypothesis, which is not in any way required to explain the data before us.

But, in spite of his dislike of the new systems, which substitute for the Christian doctrine of the Fall a theory of the gradual development of man towards an ideal perfection, Dr. M'Cosh, with not a little inconsistency, is himself a disciple of the school of Progress. He seems to believe in it as firmly as any Positivist. Instead of assenting to the Christian idea of the advance of evil with the advancing ages, or allowing the truth of the statement of Christ, that, as time goes on, "iniquity will abound and the love of many will wax cold," he draws a most hopeful picture of the future of the world and of the glorious victories of human genius and material civilization:—

"We see everywhere signs of progress. There is progress in agriculture, there is progress in the arts, there is progress in the sciences; man's dominion over nature is rapidly increasing, and the earth, every succeeding year, is made to yield a greater produce. . . . The struggle for existence still goes on; but there is evidence that the intellectual is to show itself stronger than the physical, and the moral, always under the government of God, stronger than either. For the present, we see the serpent biting the heel of the seed of the woman; but the age of serpents, with their crushing force and their cunning, is to pass away; and we see proof that the woman's heaven-born seed is to crush the head of the serpent; and, as Plato forecast it, the good shall be the uppermost, and the evil the undermost, for evermore."

The concluding Lectures of the volume take for their special subject the Life and Character of Christ. Dr. M'Cosh very truly remarks, that the whole question of revealed religion turns on the central figure of the Christian system. He therefore devotes himself to an

examination of M. Renan's 'Vie de Jésus,' and points out, as it is not difficult to do, many objections to the theory laid down. At the same time, no impartial person could say that he shows it to be impossible, or that his own hypothesis is not open to similar attacks. In spite of his detestation of M. Renan's view of the gradual development of the character of Jesus, there is something essentially and almost exclusively human in his own picture of the Founder of Christianity. In page 253 he says that "it may be allowed that Jesus becomes more faithful in his warnings, first to the Galileans, and then to the Jews at Jerusalem, as he draws near to the end of his pilgrimage." Nor does the following passage appear to us to be calculated to convert the sceptic or to build up the faith of the weak brother. We should be almost inclined to suspect the writer of Unitarian tendencies, or of a latent doubt of his own position, if he had not elsewhere proclaimed his orthodoxy.—

"The healing of Malchus' ear, besides being a proof of our Lord's tenderness in very trying circumstances, taught the disciples the nature of the instruments by which they were to propagate the truth; that is, not by the sword, but by spiritual weapons. The resurrection of our Lord is the very keystone of the believer's hopes; and what a rich fragrance gathers round the incidents of our Lord's life after his resurrection, from his rising from the grave to his ascending into heaven! M. Renan allows that Jesus himself did not distinguish between the natural and the supernatural. *I am sure that our Lord did not deceive himself here.* The supernatural was to him as easy as the natural; the supernatural was, as it were, natural to him; and the two so mingle in every part of his public life that it is vain to seek to separate them, and to take the one without also taking the other."

The italics are our own; and the statement appears to us most extraordinary on the part of one who maintains that Christ is God. Perhaps the best explanation of such passages is to be found in the apparent haste with which these Lectures were written, or in the character of the audience for whom they were designed. Dr. McCosh may be more familiar than ourselves with the temper of the theological students of New York, and of the nature of argument best suited to meet their difficulties and to build them up in the Faith. But, however this may be, we have no hesitation in expressing our regret that he allowed his Lectures to be printed and published in England, for they do not seem to us likely to do valuable service to the cause of orthodoxy, or to maintain the high reputation which their author bears in Europe. The moral which we draw from them is, that it is a great mistake for a distinguished philosophical writer to descend to the level of a popular controversialist.

*Padre e Figlia: Novella di G. T. Cimino.* (Firenze; London, Rolandi.)

SIGNOR CIMINO, who some years ago, in a novel called 'Il Barone di Strebos,' gave promise of literary ability of high order, gives us a charming specimen of his talent in the poem which describes the affecting story entitled 'Padre e Figlia.' That the *Novella* owes much of its interest to the poetical treatment of the subject cannot be doubted, for the plot is so devoid of incidents that, in prose, it could be related in a few lines; the poem, however, while it leaves the minor details of the narrative to the imagination of the reader, brings forward prominently the broad outlines of the story and the

leading characteristics of its chief actors. The scene is laid partly in Switzerland and partly in Italy, but chiefly in the country round the slopes of Mount St. Bernard, the natural phenomena of which seem to be painted by the hand of one who has wandered and meditated amongst them, so true to nature are the delicate touches which give with genuine artistic feeling the local colouring to the story. This is the more worthy of notice, as in the modern school of Italian poetry, with the exception of some lines by Alessandro Manzoni, and a splendid poem on the 'Lago di Garda,' by Giovanni Prati, probably the first of living Italian poets, nature seems to be described from books rather than from the observation and feeling of the poet. A romantic attachment formed by a young girl, Maria, for an unknown stranger, an Italian exile, who conceals his name and station, is the groundwork of the story. The father of Maria has been obliged to leave her in order to take up arms for the defence of his country, but an aged guardian warns her that the stranger is no other than Riccardo, Count of Albergiano, whose rank would forbid his marriage with her; and in spite of her lover's protestations, she refuses to see him again. In despair, Riccardo returns to Italy, where he is arrested by the Austrian authorities. Maria hears of his imprisonment, and, convinced of his fidelity to her, after a long struggle between love and duty, determines to seek him in Italy. Riccardo's mother meets her, and she learns that her lover, on condition of returning into exile, is to be set free. Maria, after writing in vain to her absent father, is married to Riccardo, and they return to her home in Vervay. Sad news awaits them; Maria's letters have never reached her father, and on his return from the war, he started in search of his daughter and her supposed betrayer. In the last canto the poor broken-hearted old man meets by chance with Riccardo, near the Monastery of Mount St. Bernard, who restores him to his long-lost daughter. Such is the bald outline of a story, which is told by Signor Cimino in a style which interests the reader by its simple pathos; it is true that in some parts the story suffers from the want of contrast to relieve the monotony of woe, but there are passages, in which the departure of the father for the war and his return after the defeat of the Sonderbund are described, which are full of life and action. Signor Cimino's verses are always correct and agreeable to the ear, and there is not a canto which does not contain stanzas specially remarkable for felicity of ideas and of expression. The third canto, in which Maria relates her sad history, is a very happy specimen of Signor Cimino's skill in narration, and the dialogue, no slight difficulty in a poem, is managed with artistic ease. The typography and general get-up of the work are worthy of commendation.

*A Concise View of the Law connected with Letters Patent for Inventions.* By James Johnson, Barrister-at-Law, and T. Henry Johnson, Solicitor and Patent Agent. (Longmans & Co.)

*Patent Law and Practice: showing the Mode of Obtaining and Opposing Grants, Disclaimers, Confirmations, and Extensions of Patents; with a Chapter on Patent Agents.* By a Practitioner. (Trübner & Co.)

THE authors of the first-mentioned work state

that in it they "have restricted themselves to an exposition of the leading principles and salient points of patent law." The work is well written, and though it is, in our opinion, too brief, it may be of use to inventors, for whom it appears to be chiefly intended. The most valuable part of the book seems to us to be the chapter on the practice of foreign governments as to the grant of letters patent. The work is not entirely free from errors, for at page 13 we find the following statement:—

"A patent was obtained for the employment of oxides of iron in the purification of coal-gas. Now there are both hydrated and anhydrous oxides of iron, and the former will not answer the purpose. Another inventor thereupon took out a patent for the use of anhydrous oxide of iron in the purification of gas; and it was held that he had a right to his patent, for he had to institute experiments for the purpose of ascertaining what kind of oxide would serve the end in view."

Now it is the *hydrated*, and not the *anhydrous*, oxide of iron which will purify coal-gas, and it was the application of the hydrated, and not of the anhydrous, to that purpose which formed the subject of the second patent referred to.

The second of the works above mentioned is, professedly, for the benefit of inventors and patentees, and, as is stated in the Preface, has been written "not so much for their own guidance as to prevent them from having to trust ignorantly to the guidance of those to whom they may be led to confide their patent business, and to enable them to appreciate at its just value the advice that may be offered for their acceptance." The work is not, and does not profess to be, a treatise on patent law, but is chiefly devoted to an explanation of the practice respecting the grant of letters patent, the opposition which may be made to such grant, the preparation and allowance of disclaimers, and the confirmation and extension of letters patent. A chapter is added on Patent Agents, a class of persons who do not seem to have any legal status, but who have, or ought to have, a considerable amount of legal, as well as of general, knowledge. The work concludes with an Appendix, containing information as to the stamp duties, fees, and expenses to be paid and borne by patentees.

#### NOVELS OF THE WEEK.

*Hetty.* By Henry Kingsley. (Bradbury & Evans.)

*Fairly Won; or, the Heiress of Enderleigh.* By H. S. E. 3 vols. (Tinsley Brothers.)

WE have sometimes wondered, in reading Mr. Henry Kingsley's novels, whether there be not in us a separate sense which they alone have the power to call into action. They are utterly faulty, according to all the usual standards by which we judge fiction, and yet we must admit that, when we see his name on a title-page, we at once know that we have a pleasure to come, much greater than that which we get from many novels far more perfect, according to all the rules of the art. His grammar is frequently very shaky; his characters behave and talk as no sane mortals ever did; the whole story is often preposterously unnatural; and yet there is so much quaintness, so many little touches entirely true to nature, such a love for "man, and bird, and beast," and let us add, ships, that we feel, as we read, that if his world is very



different from the world we see, and his people quite unlike the people we know, yet they are a world and people that we are all the better for living a short time in and among.

Now, in the present book, we have an old Methodist solicitor, who has a daughter, who runs away and behaves in all kinds of strange ways, is made good by the example of a young lady whom she has never seen, and of whose existence she is not even sure,—this young lady herself having done still stranger things,—and, finally, marries the young lady's father, a Dissenting minister, old enough to be her own father. Such is, in brief, the story, though there is a secondary plot of a forgery, (of which Mr. Turner, the solicitor, holds the proofs,) committed by a banker's son, with the complicity of the banker himself; and a burglarious attempt on Mr. Turner's house, defeated, of course, by the daughter's presence of mind. This is all commonplace enough; but Mr. Kingsley's merits come out in such passages as that where Rebecca (Turner's daughter), wishing to buy a dog, is lectured by Mr. Spicer, the sweep, and Jim Akin, the costermonger, on the virtues and varieties of those animals, as divided into the classes of "varmint" and "general"; or where Mrs. Tryon, the Protestant widow of Limehouse, has a difference with Capt. Moriarty, whose schooner, the *Ninety-Eight*, being carelessly moored, has lurched over with the tide, and broken into the widow's parlour-window with her foretopsail yard; and generally, we fancy, when he is relating, and not inventing. In fact, he is like a painter who can draw a man, or a dog, or a ship, admirably, but lacks the art of composing.

We have scarcely mentioned Hetty, who gives her name to the book. She is the daughter of Mr. Morley, half seaman and half minister, whom Rebecca ends by marrying, and does not appear in the flesh till near the end, though we hear of her prowess all along. She pairs off with Jack Hartop, one of Mr. Kingsley's favourite merchant seamen,—Bayards in pilot cloth: such may exist, though among a good many acquaintances of that class, fine fellows though they be, we never met one combining all the virtues to an equal degree.

We have stated what we think Mr. Kingsley's faults, and his merits. There are examples of both in the present book; and those who, with us, condone the latter for the sake of the former, will enjoy it: those who do not, may take our advice, and let it alone.

The Heiress of Enderleigh is a young lady who begins life at sixteen, with strong prejudices against matrimony, imbibed from her mother, who on her dying-bed warned her that "the men are all alike," and that she will be loved for her wealth's sake. The author, it is gratifying to find, does not approve the views held on this subject by the heiress and her mother, for she thanks God, in a very gushing paragraph, that "He hath reserved to Himself thousands who have not bowed the knee to the false deity.....Men who would choose the dinner of herbs where love is rather than the stalled ox and hatred therewith." The fair domain of Enderleigh, with a rent-roll of 7,000*l.* a year, inherited by our heroine, lies within the precincts of the Forest which, we are told, "the Norman Conqueror created in his mood of selfish recklessness, and the Saxon peasant

watered with tears of blood." What had been a priory before the days of Henry the Eighth had since become a country mansion, and was now destined—so thought Miss Edith Vivian—to become the home of a new Protestant sisterhood, of which she was to be the first matron. With these lofty views, it is no matter for surprise that she passed through two London seasons unhurt, and attained the mature age of twenty-one still mistress of her heart and fortune. Unluckily, however, she is induced to travel on the Continent with the family of a schoolfellow, and at the *Hôtel Bellevue*, at Bonn, she meets her future lord in the person of a cousin, Harry Neville, who of course possesses all the fine qualities for which the British officer is distinguished, adding to the list one which is perhaps comparatively rare—an intimate acquaintance with the Holy Scriptures and the works of Mr. Carlyle. With this cousin she at once falls in love, and he, ignorant of the relationship between them,—the young lady having studiously concealed her real name,—was only prevented from declaring his passion by a telegram recalling him to his father's bedside in England. The story at this point becomes really interesting, and the authoress is to be congratulated on the skill with which she has worked out the plot, and on the consideration for her readers' feelings, which has prompted her to make everybody happy at the close of the third volume. Of the literary merits of the book we can speak very highly; it is uniformly grammatical, and, with few exceptions, written in good taste, and, if occasionally somewhat effusive in sentiment, this may be put down to the fact that it is, *par excellence*, a love-story. The weakness, moreover, of all feminine authorship is betrayed in some of the language here put into the mouth of Capt. Neville, who, being intended as the type of a well-bred and well-educated English gentleman, can hardly be excused for employing in his conversation the conventional vulgarisms of the British schoolboy.

#### OUR LIBRARY TABLE.

*Modern War.* By Sir Randal H. Roberts, Bart. (Chapman & Hall.)

THE Preface of this book is somewhat misleading. The public has been dosed *usque ad nauseam* with narratives of the Franco-German war, but has been singularly ill supplied with information as to the organization of the two armies. Sir Randal Roberts promises in his Preface to remedy this defect, and our hopes were excited accordingly. A perusal of the work before us has, therefore, greatly disappointed us, for in it we find scarcely anything that has not already appeared in a score of books, pamphlets, and newspapers. That Sir Randal Roberts was qualified to supply the eagerly-coveted details, we can hardly doubt. He speaks of being attached to the staff of General Von Göben, and indeed we find him, though belonging to a neutral nation, bringing that General important information during the battle of Pont Noyelles. Sir Randal also states that he served in the British army during the Crimean and Indian Mutiny campaigns, "having been compelled to leave it from unfortunate circumstances, over which he had no control." We might fairly, therefore, have expected that his book would be a valuable contribution to the history of the war. Had we entertained any such sanguine idea, a brief glance at 'Modern War' would have dispelled it. Continually do we meet with statements which we are compelled either to refuse altogether to accept, or to view with the utmost suspicion. For instance, he

tells us that, during fifteen hours after his arrival at Cologne, "no less than sixty trains, containing 80,000 men, went through"! Again, at page 8, he being then on his road to Saarbrück, he states that there were nearly 500 French prisoners in Cologne, and asserts that he actually saw "120 French prisoners taken at Saarbrück"; yet, at page 11, he informs us that he arrived at Saarbrück in time to witness the skirmish at that place! We should like to know where the prisoners he spoke of had been captured. At Pont Noyelles he asserts that General Von Göben had only 18,000 infantry, though the whole of the 8th Corps, together with some detachments, were present, making up certainly not less than 30,000 men of all ranks and arms. The French, he asserts, numbered 60,000 men, though it was shown at the time that they did not at the outside exceed 40,000 men, many of them quite raw troops. There is no excuse for such inaccuracy, to give his offence no harsher term, in a book published nine months after the event, and when the author had opportunities of correcting his first wild statements. All through the book, however, are indications of a determination to try and establish the fact that the Prussians are not only superhumanly brave, skilful, and strong, but also that they were always in the right in their treatment of the inhabitants, invariably accurate in their accounts, mirrors of courtesy and amiability, and that any harsh treatment suffered by the French was justifiably inflicted. One more point we would touch on before concluding our notice, and we do so to show with how little precision the author narrates circumstances. He declares that on the 18th of August he was severely wounded, being carried off the field into Gravelotte only at 11 p.m.; yet on the 20th he writes to the *Daily Telegraph*, "This morning I went up from Gravelotte to look at the battle-field of yesterday." Evidently, though he wrote on the 20th, he visited the battle-field on the morning of the 19th,—pretty well for a man who had been severely wounded on the 18th. Altogether, this is an unpleasant and untrustworthy book, and one which we trust will soon sink into the obscurity which it merits.

We have on our table *A Treatise on the Application of Iron to the Construction of Bridges, Girders, Roofs, and other Works*, by F. Campin, C.E. (Lockwood).—*The Technical History of Commerce*, by J. Yeats, LL.D. (Cassell).—*A Classified Catalogue of School, College, Classical, Technical, and General Educational Works in Use in Great Britain in the Early Part of 1871* (Low).—*Blackburn Free Library, Catalogue of the Lending Department*, by D. Geddes (Blackburn, Haworth).—*Gregory's Handbook of Equivalent Prices, Money, Weights and Measures on the British and Metric Systems* (Cassell).—*Discipline and Drill*, by Capt. S. F. Page (King).—*The Tourist's Picturesque Guide to Killarney and Cork* (The Graphotyping Company).—*The Tourist's Picturesque Guide to Nottingham* (The Graphotyping Company).—*Routledge's Readings, Comic* (Routledge).—*The Semi-Barbarous Hebrew and the Extinguished Theologian*, by T. Gribble (Longmans).—*The Day of Trouble*, selected from the Writings of the Rev. W. B. Mackenzie, M.A. (Seeley).—*Die Tonkunst in der Culturgeschichte*, von E. Naumann, Vol. I, Parts 1 and 2 (Foreign). Among New Editions we have *The Law and Science of Ancient Lights*, by H. Cox, M.A. (Sweet).—*The Barons' War, including the Battles of Leves and Evesham*, by W. H. Blaauw, M.A. (Bell & Daldy).—*My Summer in a Garden*, by C. D. Warner (Low).—*The Tourist's Picturesque Guide to Scarborough* (The Graphotyping Company).—*The Centenary Edition of the Waverley Novels*, Vol. XX, 'The Talisman' (Black).—*and Reflections*, by François Duc de la Rochefoucauld, translated by J. W. W. Bund, M.A., LL.B., and J. H. Friswell (Low). Also the following Pamphlets: *Brazilian Republican Address* (Lymington, Doman).—*Letters on the Large Farm System, the Game Laws, &c.*, by G. C. Miall (Farrab).—*Digest of the Report of the Commissioners of Enquiry into the Condition and Treatment of Immigrants in British Guiana*.—*On the Knowledge possessed by the Ancient Chinese*

of the Arabs and Arabian Colonies, and other Western Countries, mentioned in Chinese Books, by E. Bretschneider, M.D. (Trübner).—*England's Greatest Enemies, and How to Crush Them: Advice on the Prevention of Cholera, &c.*, by a Physician (Dawson).—*On recent Investigations and Applications of Explosive Agents*, by F. A. Abel (Edmonston & Douglas).—*Educational Hospital Reform*, by T. J. Boyd (Simpkin).—*The Bull's-Eye* (Stevenson).—*The Latin Version of Dean Nowell's Small Catechism*, edited by H. C. Groves, D.D. (Dublin, Magee).—and *Feldpostbriefe aus Frankreich 1870-71*, von T. Batke (Nutt).

## LIST OF NEW BOOKS.

## Theology.

Cowle's Religious Teaching of Church Training Schools, 12mo. 3/6.  
Gresley's (Rev. W.) Thoughts on the Bible, 12mo. 3/6 cl.  
Modern Scepticism: a Course of Lectures, with Explanatory Paper, by C. J. Elliott, cr. 8vo. 7/6 cl.  
Short Words from the Book of Truth, folio, 2/ on rollers.

## Music.

Boosey's Royal Edition of Operas, Donizetti's 'Don Pasquale,' 2/6.  
Cathedral Chant-Book for the Daily Psalms, &c., cr. 8vo. 1/  
Novello's Edition of Operas, Donizetti's 'Lucrezia Borgia,' 2/6.

## Poetry.

Collection of Old Ballads, 3 vols. illust. 12mo. 28/ bds.  
Dante's Inferno, trans. into English Verse by E. R. Ellaby, Cantos 1 to 10, cr. 8vo. 5/ cl.  
Ezekiel, and other Poems, by B. M., 3/ cl.

## History.

Hunter's (W. W.) The Indian Musalmans, 8vo. 7/6 cl.  
Russell's (Earl) Foreign Policy of England, 8vo. 2/6 swd.  
Sheppard's (N.) Shut Up in Paris, cr. 8vo. 10/6 cl.

## Geography.

Bede's (C.) Holiday Ramble in the Land of Scott, cr. 8vo. 9/ cl.  
Cowle's (R.) Shetland, Descriptive and Historical, 12mo. 4/6 cl.

## Philology.

Ehrlich's (H. W.) French Method, 12mo. 3/6 cl.  
Virgil's Eclogues, trans. into Rhythmic Prose, with Notes, by R. M. Millington, 12mo. 1/6 cl.

## Science.

Bannister's (Rev. J.) Glossary of Cornish Names, 8vo. 12/ cl.  
Gleig's School Series, 'Mapother's Animal Physiology,' 18mo. 1/  
Mapother's (E. D.) Lidoonvaia Spas, &c., 12mo. 1/ swd.  
Stevenson's (T.) Lighthouse Illumination, 8vo. 12/6 cl.  
Reynolds's (J. R.) System of Medicine, Vol. 3, 8vo. 25/ cl.  
Richardson's Natural History, 12mo. 2/ cl.  
Roberts's Addition of Elliptic and Hyper-Elliptic Integrals, 3/.

## General Literature.

Agent of Broome Warren, 3 vols. cr. 8vo. 31/6 cl.  
Alphabet (An), Allegorical, Alliterative and Amusing, 3/6 hf. bd.  
Ballard's (I. F.) Prophetic Future of Great Britain, cr. 8vo. 1/  
Grant's (J.) Only an Ensign, 3 vols. cr. 8vo. 31/6 cl.  
Gratrix's (Rev. J.) Rills of the River, cr. 8vo. 5/6 cl.  
Houghton's (Rev. W.) The Microscope, 2/6 cl.  
Illustrated London News, Vol. 58, folio, 18/ cl.  
Lost Cities brought to Light, 12mo. 1/ cl.  
Notes and Queries, Vol. 6, 4to. 10/6 cl.  
Sunshine and Shadow, Smiles and Tears, 32mo. 1/ bds.  
Trollope's (A.) Sir Harry Hotspur, 12mo. 2/6 cl.  
Ward's (A.) My Pupil, sq. 1/6 cl.

## A PROTEST.

Warwick House, Paternoster Row, August 15, 1871.

I SHALL feel greatly obliged if you will allow me space to protest against a literary fraud of which I am the victim, and which I cannot but feel must do a serious injury to whatever reputation my devotion to literature may have won for me in America. For years past certain publishers and newspaper proprietors in that country have been in the habit of foisting on the American public almost any rubbish they could procure as written by me, issuing the same as having been written exclusively for them, or as published from "advanced sheets," supplied by me or with my approval. None of this matter so ostentatiously given to the world have I either written or seen in any shape whatever until my attention has been called to it when published abroad. I have protested time after time against the imposition, but without effect. The worst offender in the fabrication of this spurious literature is the proprietor of the *New York Sunday Mercury*, who in the issue of that journal for July 30th commences something entitled 'Leighton Grange; or, Who killed Edith Woodville,' by Miss M. E. Braddon, and who, in the body of the same paper, publishes a short editorial article in the following terms:—"OUR NEW STORY.—No one should fail to read the opening chapters of the new and thrilling story, by Miss M. E. Braddon, entitled 'Leighton Grange,' which appears on our first page to-day. The tale abounds in romantic interest

and is full of wonderful incidents of love and peril. It is the finest production that has yet emanated from the pen of the gifted authoress."

Until I saw this *New York Sunday Mercury* for July 30, I never saw this new story commenced therein. I know nothing whatever about it or its author. I am as much perplexed by its being attributed to me as I am perplexed by the persistence of this newspaper in giving to the world, time after time, stories falsely attributed to me that I have not written. This occurs, too, in the face of reiterated protests against the practice, both from myself and from others in my name. I cannot help thinking that if a "smart" English publisher were to imitate this peculiar mode of manufacture, and produce books or serial stories which he attributed to an American author of some repute in England, knowing all the while that such literature was not written by such author, a sharp outcry would quickly arise for an international copyright to arrest such monstrously dishonest practices. Let us hope that American authors and statesmen will anticipate this evil day by initiating some measure of registration which shall protect reputations against the recklessness to which I now invoke attention.

M. E. BRADDON.

## GERMAN LITERATURE.

Leipzig, August 4, 1871.

THE 'Shakespeare Jahrbuch,' referred to in my last letter, claims the first notice. The foremost papers in it, of equal interest to English and German Shakespeare students, are—"On Shakespeare's Humour," by H. Ulrici,—"K. Elze's," "On 'The Merchant of Venice,'"—W. Hertzberg's, "On the Sources of the Troilus Legend in its relation to Shakespeare's 'Troilus and Cressida,'"—M. Delius's "On Lodge's 'Rosalynde' and Shakespeare's 'As You Like It,'"—and "Shakespeare the Actor," by Hermann Kurz. The other papers are—"On a New Acting Edition of 'Macbeth,'" by R. Gericke,—"German Poets in their relation to Shakespeare," by C. C. Hense,—"How is Shakespeare to be Acted," by H. Baron von Friesen,—"and 'The Leading Features of the Tragedy of 'Hamlet,'" by W. König.

Ulrici asserts, correctly enough, that humour is more dramatic than wit, nay, is essentially dramatic, and might have enforced his remark by quoting Schopenhauer 'On the Intellect,' and would probably have done so were he not, in other respects, an opponent of that philosopher's theories. Elze enters more minutely than any of his predecessors into a parallel between 'The Merchant of Venice' and Marlowe's 'Jew of Malta,' and arrives at the conclusion that the characters of Shylock and Jessica were suggested by the latter piece. The author agrees with Gervinus in declaring the leading idea of 'The Merchant of Venice' to be the relation of man to property. It may be necessary to add, that the subject is not treated by Elze in the metaphysical, or misty, style; but his essay combines German thoroughness with a matter-of-fact tenor, and, moreover, a tolerant spirit. Hertzberg's is, as usual, a most erudite paper, proving by a chain of cogent arguments that Shakespeare's 'Troilus and Cressida' is not a conscious parody of the ancient and, more especially, the Homeric view of life, but rather a romantic picture in which views of classical antiquity are interpolated. Delius's essay is a careful investigation of the source of 'As You Like It.' In opposition to Knight and others, he denies that there is any immediate connexion between that play and 'The Tale of Gamelyn,' and would ascribe all that seems to be borrowed from that poem to Lodge's 'Rosalynde.' I would refer him, however, to the Baudry Edition of Shakespeare for a corroboration of Knight's opinion. W. König's paper on 'Hamlet' has not found favour in Bodensiedt's eyes (as I learn from his review of the 'Shakespeare Jahrbuch' in the *Augsb. Allgem. Zeit.*); but, with all due deference to his judgment, I must say that, though the paper contains no novel view, it is a very interesting article notwithstanding. The only fault I have

to find with it is the quotations from Shakespeare being in German. Surely readers of the 'Shakespeare Jahrbuch' must understand the original!

A very important contribution to the Shakespearean literature is a lecture 'On Shakespeare's Genius,' by the recently deceased Bogamil Goltz, published, along with two others (on 'Childhood, Youth, and Old Age,' and 'The German Popular Tale and its Humour'), by O. Janke, Berlin. Here a genius has written about a genius, as will be evident from even the few prefatory lines. With a few strokes of his pen, that original writer, the Jean Paul of our times, has at once brushed away the dust with which the Dryasdusts have covered Shakespeare's portrait, and set it before us in the clearest light and boldest relief. Will any English reader, after this, leave Goltz unread?

The renowned traveller Gerhard Rohlf's work—"From Tripolis to Alexandria: a Description of the Expedition accomplished at the Order of H.M. the King of Prussia, in the Years 1868 and 1869," in 2 vols. (Bremen, Kuhnmann)—though a very valuable work, replete with accurate information pleasantly conveyed, must, owing to lack of space, be dismissed with this brief notice. The photographs, maps, and plates contained in the work enhance its value.

E. A. Seemann, Leipzig, has published 'A History of German Poetry of Modern Times,' by Prof. Dr. C. Lemcke, the first volume reaching from Opitz to Klopstock. It is one of the dreariest periods of German literature which the author has here treated; but he has entered into it with so much zest and spirit as to invest it with a greater degree of interest than it has hitherto seemed to possess. I use the comparative; for, after all, one must have delved in the mine as our author has done before one can learn to appreciate its treasures.

O. Wigand, Leipzig, has issued a second rewritten edition of 'The Freedom of the Human Will, and the Unity of the Laws of Nature,' by J. C. Fischer, a book which, on its first appearance, was received with as much applause by one party, the materialist school, as abuse by the other, the spiritualists; but there can be no doubt that the author has honestly grappled with the knottiest of all subjects, and, though going the extreme length of materialism, has, by his mode of handling the question, made out a strong case against free agency. The same publisher has brought out a new work by Prof. J. Scherr, 'Demons,' containing, "instead of a Preface," a Letter to a Friend on the subject of the Zurich row on the 9th of March last, and the following essays: "A Loving Woman," being the story of Abelard and Eloise; "A Turkish Saviour; or, the Story of Börekliidsche Mustafa," told after Dukas's 'Historia Byzantina'; "A Christian Priest," being an essay on Torquemada and the Inquisition; and "A German Poet," treating of that eccentric but vigorous dramatist, D. C. Grabbe. All these papers, in some measure, serve as mere texts for the author's commentary, or as pegs for his trenchant, outspoken remarks, which are unsparing in their aim, the author bowing down to no *idola fori*, or *tribus*, or theatre; but, though a political refugee, he is German to the backbone, and, though a republican, carries his Gallophobia to the height of a W. Menzel's, which had become proverbial even prior to 1870.

The political publications, naturally, still bear upon the late war. Franz Lipperheide has, conjointly with G. Scherer, published 'Die Wacht am Rhein,' containing the complete history of the famous song, with the portraits of the poet and the composer, fac-similes of the original MS. of the poem in its successive stages, the musical notes for piano and part-song, and all the translations, among which there are two Hebrew, two Greek, and no less than seven English ones: the proceeds of the splendidly got-up publication to be devoted to the benefit of the German Invalids' Fund. The same patriotic and public-spirited publisher has issued, for the same charitable object, 'From the Camp,' War-Songs, by Julius Wolff. 'Cross and Sword,' 'Chimes of the Times,' by Fr. W. Baron von Dittfurth, and 'Merlin the



Magician,' a poem by W. Müller von Königs- winter, dedicated to the Crown Princess of Prussia and of the German Empire, &c. The name of the poet is a sufficient guarantee for the superior quality of the poetry. He treats the subject in a different spirit from Immermann; how far he approaches Mr. Tennyson, or deviates from him, I have not yet had time to examine.

Springer, Berlin, has just issued the 'Fourth Annual of Political History of the Present Time,' by W. Müller, Professor at Tübingen, being a full chronicle of the events of 1870, i.e., from the commencement of the year, so that it is indispensable to the historian, diplomatist and politician, &c., as being the only complete chronicle of that memorable year. While writing this the same publisher's important pamphlet, 'Zur deutschen Währungs- und Münz-frage,' comes to hand.

Richter, Hamburg, has reprinted from the Hamburg newspaper, *Reform*, the memorable events of 'Louis Napoleon's Life and Government,' by Dr. Fr. Richter. It is a trustworthy and sufficiently impartial, though unpretending narrative, with the motto: "Difficile satiram non scribere." Dr. E. Bauer, the Altona publisher, has issued a trifle that makes one fervently sigh, its title being 'Peace-Songs, War to War.' They breathe a religious spirit. Asher & Co., Berlin, have published, for the benefit of the Societies in Aid of the Sick and Wounded, 'A Fragment of the Last Canto of Reynard the Fox.' This, too, is a trifle as regards bulk, but a gem in value; Reynard, of course, is Louis Napoleon: with whom he is at war, and who King Nobel is I need not tell the reader. The poetical fragment bears date Berlin, March 17, 1871, and is signed "Z." The writer's name, which I am not authorized to divulge, is well known to the frequenters of the British Museum, where, for a number of years, he held a post and adorned it by his prodigious scholarship, of which, too, he left a memorial behind him in the shape of an admirable Catalogue. But probably few of his friends would have given him credit for such a spirited and classical bit of satirical poetry as he has here produced.

'The Prussian People's Training System and the European Federative Republic of the Future,' by Dr. Ed. Loewenthal, &c. (Zurich, Schröter), is the latest inflammatory production emanating from that author's pen. His motto is, "The Europe we see before us is only the Europe of Princes. The Europe of Peoples we have yet to see grow up." Need I say that the pamphlet is as anti-Prussian as the fiercest foe of that country could wish.

I have before me the following Lectures:—'The Papal Infallibility and the Vatican Council,' by Prof. Dr. Paul Hineschius (University Publishing Office, Kiel), being a brief, but most able summary of the development of that dogma, and exposing its fallacy and the weakness of its foundation. The author, though but thirty-four years of age, has already distinguished himself as a writer on the canon law, and has just been selected as the representative of his university in the Upper Chamber at Berlin. Great things may yet be expected from him.—'Dante and His Time,' by Prof. H. Keller, of Aarau (Aarau, Sauerländer), treats its subject in a popular manner, and may serve as a very good initiation into the study of the great Italian poet.—'The World as Conception,' by Ad. Fick, who delivered this as an introductory lecture to his course on physiology in the University of Würzburg. He adheres to Kant's transcendental theory, which he maintains he finds tacitly, or rather secretly, admitted even by Mr. J. S. Mill, in Sect. 5, Ch. v. of his 'Logic.'

I conclude in recommending to your readers' attention a well got-up and highly-instructive monthly, *Aus allen Welttheilen*, an Illustrated Family Paper for the Promotion of the Study of Geography and Ethnology. It is published by A. Refelshofer, of this town, and ably edited by Dr. A. Delitsch, Lecturer on Geography in our University, and is a decidedly superior periodical, not a mere trade speculation. Reports on the two important works, 'Æsthetics,' by Dr. Schasler, and 'Language as an Art,' by Gerber, I must again reserve for my next.

D. A.

#### THE LONDON SCHOOL-BOARD.

THE Board will, on the 6th of next month, sit *pro forma*; but the sitting of Wednesday last is, in effect, the last of the present Session. At it the business negotiations between the Board, the Finance Committee of the Board, the Public Works Loan Commissioners, and the Education Department, with regard to the proposed loan of 100,000*l.*, were carried a step further. Naturally enough, there are considerable formal difficulties in the way of so large a transaction. After this ensued a discussion as to whether certain schools, recommended *ad hoc* by the Works Committee, should or should not be taken over by the Board. Mr. W. H. Smith and Mr. William Rogers suggested that there could not be too much caution exercised in the adoption of such recommendations, and that it would be very ill-advised of the Board to connect itself with "wretched schools, not worth the taking over." In answer to this it was pointed out that, because the school buildings were bad, it by no means followed that the teaching given was not good, or that the class of scholars who attended were not such as to merit the consideration of the Board. Ultimately it was agreed that five ragged schools should be taken over by the Board for a period of one year. These schools are situated in Motley Street and Willow Walk, Shoreditch; in Brook Street, Hampstead Road; in Kent Street, Borough; and in the New Cut, Lambeth; which are all places where the Board has resolved to erect schools of its own. Thus, then, it really takes over, not the school-buildings, but only the scholars,—the number of whom reaches to about 1,000. A considerable discussion ensued as to the exact liability in which the Board is involved by taking a school over for a year,—a point upon which the members generally appeared to have rather more to say than they exactly knew. Ultimately it was very wisely resolved, that the terms of transfer should in each case be drawn by the solicitor to the Board, and that the buildings should be put into effective sanitary condition by the Board surveyor.

So ended the first session of the first London School-Board.

#### Literary Gossip.

THE Twenty-eighth Annual Meeting of the British Archaeological Association will commence at Weymouth on Monday next. We shall give a full report of the proceedings.

MRS. ROWLAND WILLIAMS is collecting materials for a Memoir of her husband, the late Dr. Rowland Williams. We are requested to state that Mrs. Williams will be much obliged to any of his correspondents who may have kept letters, if they will lend them to her, with a view to the publication of such parts as may be of general interest. Mrs. Williams's address is Woodlea, Grassendale, Liverpool.

Two parts of George Wither's 'Juvenilia' conclude the issue of the Spenser Society for the present year. The third part, which completes the work, will be published early next year. This is the most interesting and, so far as poetical merit is concerned, the most valuable publication the Society has yet given its members. Since the unfortunate destruction of the Bristol reprint, no attempt to reprint Wither's early and most characteristic writings has been made. The editions used in the present publication are those of 1626 and 1633. Part I. contains 'Abuses Stript and Whipt,' the satire of which caused the author's imprisonment in the Marshalsea. Part II., 'Certaine Epigrams'; 'Prince Henrie's Obsequies, a Satyre written to the King's Most Excellent Majestie'; 'Epithalamia'; 'The Shepherds' Hunting'; and 'Fidelia.' Wither's 'Motto,' and 'Faire Vertue, the Mistress of Philarete,' will form the concluding

volume. Mr. Corser having an unrivalled collection of Wither's works, the Spenser Society will reprint them all. Wither wrote more than almost any of his contemporaries. Amid the productions of one who made his muse his drudge, are found, by those who can seek, some of the finest gems of seventeenth-century poetry.

It is hoped that the second of the Spenser Society's issues for 1871-2 will be the concluding volume of the works of John Taylor, the Water-poet, all of whose pieces, except a few in the British Museum, the Society has in print.

MR. JUSTIN SIMPSON is preparing for publication a List of the Lincolnshire Series of Tradesmen's Tokens of the Seventeenth Century. The work will give a descriptive account of more than two hundred and twenty specimens of these coins issued in this county by corporations and tradesmen between 1649 and 1672 (in the latter year they were cried down by royal proclamation).

We understand that a text-book of English, the joint work of Prof. Seeley and Mr. Abbott, which was announced some time ago, will be published before the end of the present month. It is entitled 'English Lessons for English People,' and treats of Synonyms, Etymology, the Diction of Prose and Poetry, Metre, Selection and Arrangement in Composition, &c. Though primarily intended for use in the higher forms of schools, it contains a good deal that may be of interest to general readers.

THE Harleian Society, which prints the Heraldic Visitations of Counties, and manuscripts relating to Genealogy, numbers now 267 members. It has only published three thin volumes in two years, but has accumulated a balance of over 350*l.*, which ought (we think) to have been put into paper and print before now. But the Society has at press 'The Visitation of Oxford in 1574 and 1634,' and 'The Visitation of Nottingham in 1614,' and is to proceed shortly with 'The Visitation of Devonshire in 1620.' For county-history these Visitations are, of course, invaluable.

M. EDMOND VILLETARD, a writer in the *Journal des Débats*, has published at Paris a new work, entitled, 'L'Histoire de l'Internationale,' contained under the following heads:—The Associations of Working Men; The Trades-Unions; The Foundation of the Internationale; Its Organization, Congresses, and Papers; The Internationale and the Empire; The Internationale and War; The Internationale and Revolution. The author has added a very interesting Appendix, full of curious authentic documents.

The second volume of Dr. Friedrich W. Ebeling's work, 'Friedrich Ferdinand Graf von Beust,' a history of his life and statesmanship, has been published at Leipzig.

M. FRÉDÉRIC THOMAS has been re-elected unanimously President of the Paris Société des Gens de Lettres.

M. BÉDARRIDES, a French artillery officer who served in the Crimean War, and wrote an interesting work on that war, has written a very able brochure, entitled 'Réorganisation de l'Armée Française, ou Morale de l'Invasion Prussienne,' founded on his observations during the campaign of 1870 in the Army of the Rhine.

A brochure by M. G. de Chanlin, entitled 'Les Prisonniers-de-Guerre Français en Wurtemberg pendant la Campagne 1870-1871,' gives an account of the condition of the French prisoners in Wurtemberg, where 13,126 were detained, and also gives information of the assistance afforded them from private sources.

THE Calcutta School-Book Society have lately published in their series the 'Proverbs of Europe and Asia translated into Bengali,' and also, 'Two Thousand Bengali Proverbs, illustrating Native Life and Feeling.' Both selections were made by the Rev. J. Long. The former was translated by Bábú Rangalál Banerjea, and contains 1,181 European and Asiatic proverbs, including 200 Russian. The latter is a very useful collection, as Morton's book, printed at Calcutta nearly forty years ago, has been long out of print. Mr. Long has also published in a separate form an English translation, reprinted from the *Englishman's Weekly Journal*. Some of the proverbs are terse and witty, but they are often obscure from their allusions. We give a few:—"The mother of many sons is never taken to the Ganges," i.e. each shifts the responsibility. "The boat is now carried in the cart, the cart now carried in the boat," i.e. the ups and downs of fortune. "He is between two minds, whether he should be burnt or buried," i.e. be a Hindú or a Musulman. "A service fleeting as the palm-leaf's shadow." "He feeds the vulture from his table, still the vulture watches for the death of the cow." "While cutting the plantain fruit, it fell; he says he made it an offering to Krishna," i.e. a virtue of necessity. "The crow eats the flesh of all, but no one finds the crow's flesh," they are so long-lived. Crows are sometimes blown from their branches and killed by a sudden storm at night, hence the proverb, "The crow died from the storm; no, says the owl, it was from my curses."

MR. W. L. R. CATES requests us to state that he is joint author with the late Mr. B. B. Woodward of the forthcoming 'Dictionary of Dates' which we spoke of last week.—Mr. Cates's engagement as *collaborateur* having commenced in 1860.

## SCIENCE

### BRITISH ASSOCIATION.

#### SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

FRIDAY.

MR. J. N. LOCKYER delivered an address 'On the Recent and Coming Solar Eclipses,' illustrated by magic-lantern views of total eclipses, as photographed by various observers, and by discharges from an induction coil in hydrogen at different pressures, and between magnesium points in air, the discharges being viewed through a spectroscope by Prof. TAIT, who described to the audience the appearances presented.—The enormous and rapid changes to which the corona is subject were strongly insisted on, and were well shown by some of the photographic views. By directing the spectroscope to the sun's edge, the spectra of the photosphere and of the chromosphere may be seen in juxtaposition. Some of the dark lines in the spectrum of the photosphere are continued as bright lines in the spectrum of the chromosphere, and those bright lines which extend furthest belong to substances which extend to the greatest height in the sun's atmosphere.

Prof. O. REYNOLDS gave an electrical explanation of the Sun's Corona, and of Comets.

Prof. TAIT remarked that the experiments which Prof. Reynolds had just shown were interesting from an electrical point of view, but the theory which they were intended to illustrate could not be accepted.

M. JANSSEN delivered an address, in French, 'On the Coming Solar Eclipse,' and expressed the hope that the two countries would co-operate in observing it to the best advantage.

MR. GLAISHER read the 'Report on Luminous Meteors.'

MR. BIRT read the 'Report on Lunar Objects suspected of Change.'—It seems to be completely established that Plato (a plain some 60 miles in diameter, surrounded by high mountains) is undergoing change, the spots upon it being much more numerous than formerly, and fresh streaks being also observed.

Prof. STOKES read a 'Notice of the Researches of the late Rev. W. Vernon Harcourt on the Conditions of Transparency in Glass.'—Mr. Harcourt, who was one of the earliest and most active members of the British Association, carried on, for nearly forty years, experiments on the manufacture of glass for optical purposes. One of his most successful results was the construction of discs of terborate of lead and of a titanic glass, of about 3 inches diameter, almost homogeneous, and with which it is intended to attempt the construction of an actual object-glass which shall give images free from secondary colour. One of these discs was exhibited to the Section.

MR. G. J. STONEY gave a paper 'On a Cause of Transparency,' the most interesting part of which consisted of an account of experiments on the spectrum of chloro-chromic acid. The positions of thirty-one lines in this spectrum were determined with an accuracy of  $\frac{1}{16}$ th of their mutual distances, and were found to be all of them harmonics of one fundamental vibration of too long period to be visible. These observations had suggested to him a theory of the cause of transparency in bodies, which he illustrated by reference to the jarring sound which is heard in the immediate neighbourhood of a bell when it is struck, but is not heard at a distance. The waves of light emitted by a radiating body are analogous to those sound-waves from the bell which travel to a distance, while the molecular motions of transparent bodies seem to resemble those confused motions of the bell which produce the jarring sound.

DR. JOULE gave an account of 'A New Dip Circle.'—The axle, instead of rolling at its two ends on agate planes, was hung by two loops, each consisting of a silk fibre. The injurious effect of irregularities of form in the axle was thus greatly diminished, and there was less chance of a particle of dust getting in the way, so as to hinder the rolling. An observation could be taken in ten minutes, and the instrument might be left for a long time in position. Observations with this instrument had shown that 20 minutes before 10 is the time of maximum dip, and the difference of maximum and minimum is no less than 5'.—In answer to a question, Dr. Joule said that he had succeeded in making the instrument thoroughly portable.

Prof. EVERETT read a paper 'On the General Circulation and Distribution of the Atmosphere,' the effect of the irregular distribution of land and water being left out of consideration, as constituting a separate subject of itself. The theory which he maintained is partly due to Prof. James Thomson, and partly to Mr. W. Ferrel, of Boston, U.S. A body travelling along a great circle or a parallel of latitude, in the northern hemisphere, requires a constraining force from its right hand to prevent it from swerving to its right. This force is the same for all directions of motion in a great circle, and is (for a body of unit mass) twice the product of the linear velocity of the body relative to the earth's surface, the angular velocity of the earth, and the sine of the latitude; and when the motion is along a parallel of latitude, the force differs from this generally by less than one per cent. The

falling off of barometric pressure from the tropical belts to the poles and equator is due to the fact that the movement of the atmosphere is, upon the whole, towards the east in extra-tropical, and towards the west in inter-tropical regions. The lower strata of air, having less than the average eastward or westward velocity which prevails in the strata above them, are not able to resist the differential pressure towards the pole or equator which the motion above them produces. This is the origin of the prevailing south-west winds in the north temperate zone. Similar principles apply to the southern hemisphere; but the tendency of a moving body there is to swerve to its left. The rotation of cyclones, the central depression in cyclones, and Buys-Ballot's law, are explained by this same tendency to lateral swerving.

Prof. COLDING read a portion of a paper, entitled 'Remarks on Aerial Currents,' in which formulæ were given for the velocities of the different particles of a fluid circulating in the annular space between two vertical cylinders, and for the form of the surfaces of equal pressure. The formulæ had been tested in the case of a hurricane at St. Thomas's.

Prof. ZENGER exhibited a "Nutoscope," for illustrating Precession and Nutation.

SATURDAY.

SIR W. THOMSON read the 'Report of the Tidal Committee.'—The work performed for the Tidal Committee since the last meeting of the Association had consisted chiefly in the evaluation of tide components in a similar manner to that described in the previous Reports. Mr. Parkes having again placed the tracings of the curves of the Kurrachee (Manora) self-regulating tide gauge at the disposal of the Committee, a second year's observations had been read off and completely reduced. In addition to the tide components evaluated for Liverpool and Ramsgate, others had been introduced to correct the lunar diurnal (declinational) tides for parallax. Those components had been found to have sensible values for Kurrachee, where the diurnal tides are comparatively large. The solar elliptic semi-diurnal components had also been included, now that two complete years' observations were available. The comparison between the calculated and recorded heights from Liverpool not being considered as good as might have been expected from the labour bestowed on them, it was determined to continue the analysis of the Liverpool tides, with the view, if possible, of detecting the cause of the largeness of some of the differences. The uncertainty in the mean level of the water is an element which must at times seriously affect the differences between calculated and recorded heights, in any method of computation of heights from a fixed datum. It was much to be regretted that the authorities at Liverpool had chosen the George's Landing-Stage for a tide-gauge, affected as it must be (sometimes to a considerable extent) by the ever-varying weight it has to bear. This would affect the whole of the tide components evaluated, but more especially the solar components, and will account for the different values of the solar semi-diurnal tide, which, judging from the corresponding lunar component, should agree within much narrower limits. It was therefore thought that, should it be determined to again discuss the Liverpool tides, it would be better to take the tide curves as self-registered at Helbie Island, at the mouth of the Dee, in preference to those of the George's Pier. It having come to the knowledge of the Committee that the United States Coast Survey Office were in possession of a series of hourly tidal observations, taken at Cat Island, in the Gulf of Mexico, of a remarkable character, it was thought a favourable opportunity of testing the value of the harmonic analysis for the evaluation of the components of the tides of this place, which appeared very complicated and peculiar. Application having been made, a series of about thirteen months had been received, and were now in course of reduction. Although the lunar and solar semi-diurnal tides were very small in value, the series of means from which they were obtained were extremely regular and good, and the consequent determination of the phase of spring tides



from their respective epochs was probably correct within a few minutes. The proportion between the amplitudes of the lunar and solar semi-diurnal tides was the nearest to equality yet obtained, being in the ratio of 11 to 6. The proportion between the lunar and solar diurnal (declinational) tides was about 4 to 1. After reading the Report, Sir William said that one chief object which the originators of this investigation had in view was the determination of long-period tides, and particularly the lunar declinational fortnightly tide, and the solar declinational semi-annual tide. The reason for desiring the determination of such tides with great accuracy was that this would give a means of estimating with absolute certainty the degree of elastic yielding which the solid earth experienced under the tide-generating influences of sun and moon. It was quite certain that the solid earth did yield to some degree, as it must do so unless it were infinitely rigid. It had long been a favourite assumption of geologists that the earth consisted of a thin shell of solid rock, twenty to fifty miles thick, according to various estimates, inclosing an interior filled with melted material—lava, metals, &c. This hypothesis was, however, untenable, because, were it true, the solid crust would yield with almost as perfect freedom (on account of its thinness and great area) as if it were perfectly liquid. Thus the boundary of the solid earth would rise and fall under the tide-generating influences so much as to leave no sensible difference to be shown by the water rising and falling relatively to the solid, showing that if the earth, as a whole, had an average degree of rigidity equal to that of glass, the tides would be very much diminished from the magnitude corresponding to a perfectly rigid globe with water like that of our seas upon it. This consideration, he had shown, rendered it probable that the earth had considerably more average rigidity than a globe of glass of the same size. The mathematical calculation showed a somewhat startling result, to the effect that a globe of glass of the same size as the earth, if throughout of exactly the same rigidity as glass on a small scale, would yield, like an india-rubber ball, with remarkable freedom to the tide-generating influences, thus leaving a very much smaller difference to be shown by water if placed on the surface of such a globe, and estimated in its rise and fall relatively to the solid bottom on which it rested. The precise agreement of precession and nutation with dynamical estimates founded on the supposition of the earth being perfectly rigid, made it probable that the earth was, in reality, vastly more rigid as a whole than any specimen of surface rock in the condition in which it was when experimented on in our laboratories. In speaking on this subject about ten years ago with Dr. Joule, that gentleman suggested that probably the great pressure in the interior produces in the material—which might be of the same substance as surface rocks—a greatly increased rigidity in its actual position at any great depth below the surface; but the proposed tidal observation and calculation was the only method which gave directly, and without any possibly doubtful suppositions regarding interior arrangement of density on the earth, a measurement of its elastic yielding to the tide-generating influences. Now that observations from so low a latitude as that of Cat Island were available for comparison with those of the tides on our own coast, the Committee might advance hopefully to this part of their inquiry, which they proposed to make a primary object in the calculations to be next undertaken.

The remainder of the sitting was devoted to the following papers on Pure Mathematics:—‘Report on Hyper-Elliptic Functions,’ by Mr. W. H. L. RUSSELL, —‘Note on a Question in Partitions,’ by Prof. SYLVESTER, —‘On the Number of Invariants of a Binary Quantic,’ by Prof. CAYLEY, —‘On Linear Differential Equations,’ and ‘On Focal Properties of Surfaces of the Second Order,’ by Mr. W. H. L. RUSSELL, —‘On Certain Families of Surfaces,’ by Mr. C. W. MERRIFIELD, —‘Description of Model of Ruled Cubic Surface,’ and ‘On Vortex-Rings,’ by Prof. BALL, —‘On the Mathematical Theory of

Atmospheric Tides,’ by Prof. CHALLIS, —‘Remarks on Napier’s Original Method of Logarithms,’ by Prof. PURSER, —‘On the Calculation of  $\epsilon$  from a Continued Fraction,’ ‘On Certain Definite Integrals,’ and ‘On Lambert’s Proof of the Irrationality of  $\pi$ , and on the Irrationality of certain other Quantities,’ by Mr. J. W. L. GLAISHER, —‘On doubly Diametral Quartan Curves,’ by Mr. F. W. NEWMAN, —‘On a Canonical Form of Spherical Harmonics,’ by Prof. CLIFFORD.

PROFS. CAYLEY and CLIFFORD, before reading their papers, offered some remarks on Quaternions. They both expressed opinions to the effect that quaternions had the advantage of possessing a short symbol for an operation of very frequent occurrence in physical science; but that in many applications, especially in descriptive geometry, abridged notation, in the form in which it is used by Arnhold and Clebsch, had an equal advantage of compactness over quaternions.

## MONDAY.

Prof. EVERETT read the ‘Report of the Committee on Underground Temperature.’—The intended boring at the bottom of Rosebridge Colliery has not been executed, recent occurrences in a neighbouring pit having given reason to fear an irruption of water in the event of such a boring being made. Careful observations of temperature have been taken by the engineers of the Alpine tunnel under Mont Fréjus (the Mont Cenis tunnel). The highest temperature in the rocks excavated, 85° 1 Fahr., was found directly under the crest of the mountain, which is just a mile overhead; the mean annual temperature of the crest over it being estimated, from comparison with observed temperatures at both higher and lower levels (San Theodule and Turin), at 27° 3 Fahr. Assuming this estimate to be correct, the increase of temperature downwards is at the rate of 1° in 93 feet, which, by applying a conjectural correction for the convexity of the surface, is reduced to about 1° in 81 feet as the corresponding rate under a level surface. This is about the rate at Dukensfield Colliery, and much slower than the average rate observed elsewhere. The rocks are extremely uniform, highly metamorphosed, and inclined at a steep angle. They contain silica as a very large ingredient. They are not faulted to any extent, and are very free from water. It is proposed to sink two bores, to the depth of from 50 to 100 feet, at the summit and another point of the surface over the tunnel, with the view of removing the uncertainty which at present exists as to the surface-temperature. Mr. G. J. Symons has repeated his observations at every fiftieth foot of depth in the water of the Kentish Town well, between the depths of 350 and 1,100 feet, the surface of the water being at the depth of about 210 feet. The observations which have been repeated are thus completely free from the disturbing effect of seasonal changes. The results obtained agree closely with those previously found, and show between these depths a rate of 1° in 54 feet, which, from the estimated mean temperature of the surface of the ground, appears to be also very approximately the mean rate for the whole 1,100 feet. The soil, from 325 to 910 feet of depth, consists mainly of chalk and marl, and shows a mean rate of 1° in 56 feet. From 910 to 1,100 feet, it consists of sandy marl, sand, and clay, and shows a mean increase of 1° in 54 feet. The former of these is in close agreement with trustworthy determinations made by Walferdin from observations in the chalk of the Paris basin. These are as follows:—Puits de Grenelle, Paris, depth, 400 mètres; rate, 1° F. in 56·9 feet. Well at Military School, Paris, depth, 173 mètres; rate, 1° F. in 56·2 feet. Well at St. André, 50 miles west of Paris, depth, 263 mètres; rate, 1° F. in 56·4 feet. General Helmersen, of the Mining College, St. Petersburg, informs the secretary, that in sinking a well to the depth of 540 feet at Yakoutsk, in Siberia, the soil was found to be frozen, probably to the depth of 700 feet. The rate of increase from 100 to 540 feet, was 1° F. in 52 feet. A new pattern of thermometer, recently constructed for the Committee, promises to be of great service—a maximum thermometer, on Negretti’s principle,

adapted to be used in a vertical position with the bulb at the top. The contraction in the neck prevents mercury from passing into the stem when the instrument receives moderate concussions. Before taking a reading, the instrument must be gently inclined, so as to allow all the mercury in the stem to run together into one column near the neck. On restoring the thermometer to the erect position, the united column will flow to the other end of the tube (that is, the end furthest from the bulb), and it is from this end that the graduations begin. It is set for a fresh observation by holding it in the inverted position, and tapping it on the palm of the hand. This instrument, like that heretofore used, is protected against pressure by an outer case of glass, hermetically sealed.

‘Report on Thermal Conductivity of Metals,’ by Prof. TAIT.—Forbes, the first to make determinations of absolute conductivity, had discovered that the order of conducting power in metals was the same for heat as for electricity. The Committee had ascertained by their experiments, that the same thing held good for different specimens of copper of different degrees of purity. They were now experimenting on a bar of German silver.

‘On a Steam-Gauge,’ by Prof. ZENGER.—This was a mercurial manometer with compressed air, the manometric tube consisting of a series of cylinders, continually diminishing in diameter upwards, and the too rapid movement of the mercury being prevented by making two portions of its course consist of capillary tubes. It requires less attention than spring-gauges, is quicker in its action, and much more sensitive at high pressures, on account of the diminishing diameter of the tubes.

‘On the Temperature-Equilibrium of an Enclosure in which there is a Body in Visible Motion,’ by Prof. BALFOUR STEWART.—This paper consisted of a theoretical proof that, in an enclosure void of air, free from gravity, and having its walls permanently kept at a uniform temperature, a rotating body could, by a certain arrangement of screens, be made to radiate more heat to one part of the enclosure than it would receive in exchange, while the opposite effect would occur at another part. Difference of temperature would thus be produced in different parts of the enclosure, and this would furnish the means of obtaining work. The doctrine of dissipation of energy showed that such a result could not occur without loss of kinetic energy in the rotating body. The screens must be so arranged that, from one part of the enclosure, only the side of the body which is approaching is seen, and from another part only the side which is receding. A similar loss of kinetic energy must occur in the case of bodies approaching or receding from each other; and the principle has an interesting application to cosmical bodies and sun-spots.

The room having been darkened, Prof. BALL exhibited, in the usual way, the phenomenon of smoke-rings, the rings being made to run along a beam of sunlight admitted through a hole in the shutter. Frequently one ring struck another, in which case very pretty vibrations were produced.

Mr. H. DEACON read a paper ‘On the Production of Vortex-Rings in Liquids,’ and exhibited some experiments, by dipping a tube in a coloured liquid, and then very cautiously dipping it in water. The coloured liquid slowly descended, forming filaments terminated below by rings.

Mr. C. TOMLINSON stated that the experiments just performed by Mr. Deacon had been performed by him, and described in a paper many years ago. Smoke-rings had been exhibited by Prof. Boswell Reid twenty years ago in Exeter, and had been produced still earlier by Prof. Daniell, of King’s College.

Prof. EVERETT read a paper ‘On Wet and Dry Bulb Formulae.’—August, Apjohn, and Regnault have investigated formulae for determining the dew point, by calculation, from the temperatures of the dry and wet bulb thermometers; but Regnault’s experiments on the specific heat of air were not performed till a later date; and all these authors have adopted, in their investigations, the value

obtained by Delarocche and Berard, which is '267, whereas the correct value is '237. But when this correct value is introduced into Regnault's formula, the discrepancies which he found to exist between calculation and observation are increased, and amount, on an average, to about 25 per cent. of the difference between wet-bulb temperature and dew point. August and Apjohn erred in assuming that the air which gives heat to the wet bulb falls to the temperature of the wet bulb, and becomes saturated. These two false assumptions would jointly produce no error in the result, if the depressions of temperature in the different portions of air affected were exactly proportional to their increments of vapour-tension, and if some of the air were saturated at the temperature of the wet bulb. But it is probable that, when there is little or no wind, the mass of air which falls sensibly in temperature is larger than that which receives a sensible accession of vapour, and that, in high wind, the supposition that some of the air has fallen to the temperature of the wet bulb is more nearly fulfilled than the supposition that it has taken up enough vapour to saturate it. The effect of radiation, which is ignored in the formulae, leads in the same direction as these two inequalities, and all three are roughly compensated by attributing to air a greater specific heat than it actually has. The discrepancies above referred to are thus explained.

Dr. APJOHN said it was true his formula was obtained by employing what is now believed to be an erroneous value of the specific heat of air, but it nevertheless gave results conformable to observation. He thought that the erroneous point in his hypothesis probably consisted in the assumption that the film of air which is cooled down to the temperature of the wet bulb is saturated with vapour.—Prof. J. CLERK MAXWELL said there was reason to believe that the rate of diffusion of heat was nearly the same as that of vapour, the difference being about 6 per cent. If the air were perfectly still, the equilibrium of temperature for the wet bulb would depend on diffusion. In all investigations that he had met with, a convective equilibrium was assumed. He thought the action which really occurred was a mixture of the two. The subject was important, not, however, so much for the sake of its application to the wet and dry thermometers as for its bearing on the conduction of heat in air, a subject of great experimental difficulty.—Mr. C. V. BROOKE said that Mr. Dines was engaged in experiments on the subject. His own experience had led him to believe that the correction for barometric pressure was not properly applied.

Observations on Water in Frost rising against Gravity rather than Freezing in the Pores of Moist Earth, by Prof. J. THOMSON.—This paper contained an account of facts which he had observed, confirmatory of the theory propounded by him at the Cambridge meeting in 1862, that the disintegration of stones and earth by frost is not, in ordinary cases, to be attributed to expansion of water in freezing, but to a tendency of crystals to increase in size when in contact with their liquid, even when in order to do so they must push out of their way the porous walls of the cavities in which they are contained. Slabs of frozen earth are thus frequently lifted up and kept supported on columns of transparent ice. In some of the observations now described, successive tiers of earth supported on ice pillars were thus raised. In one instance, the earth beneath being unfrozen and kept moist by communication with a pond at a lower level, the water preferred to rise out of the moist earth, particle by particle, and to push up the load of columnar ice and slabs of gravel, and draw up water after it from below, by capillary action, at less than atmospheric pressure, rather than freeze in the pores of the moist earth.

Mr. D. GILL gave an account of observations on the 'Parallax of a Planetary Nebula.'—Huggins had suggested that, as the planetary nebulae have not a stellar constitution, they may be comparatively near us. The nebula in Draco, No. 37 in Herschel's 4th Catalogue, is favourably situated,

being nearly in the pole of the ecliptic, and passing nearly through the zenith of Aberdeen. The observations were made with a silvered-glass Newtonian, of 13 inches aperture, equatorially mounted, and driven by clock-work. The micrometer with which the measures were made was exhibited to the Section. The difference of position detected in a month was rather more than a second of arc.

A short letter was read from Mr. L. CLARK, describing a new form of galvanic battery, of great constancy.

Mr. D. M'FARLANE gave an account of experiments for determining in *absolute measure* the surface conductivity of a copper ball surrounded by an enclosure coated inside with lamp-black. The ball, having a thermo-electric junction at its centre, was suspended in the interior of a closed space kept at a constant temperature of about 16° C. The other junction was kept at the temperature of the envelope; the circuit was completed through a mirror galvanometer, and the deflections were noted at intervals of a minute as the ball cooled. When the surface of the ball was polished its emissive power increased from '000178 at 5° of temperature-difference to '000226 at 60° of difference. With blackened surface the corresponding numbers were '000252 and '000328, being greater than the others in the ratio of about '694. The units are the centimetre, the gramme, and the gramme-water thermal unit. It is immaterial what scale of temperature be referred to, as the temperature-difference and the quantity of heat emitted have their numerical values changed in the same ratio by change of temperature-scale.

Dr. GLADSTONE read a paper 'On the Corrosion of Copper-Plates by Nitrate of Silver.'

Prof. ZENGER exhibited and explained 'A New Key for the Morse Printing Telegraph.'—Its chief peculiarity consists in the use of a bell, struck at regular intervals (two or three times in a second) by means of a clock-work movement, the object of which is to enable the telegraphist to follow an accurate rhythm in making electrical contacts. The mechanism is so contrived that, when this is done, the dots and dashes constituting the recorded signals shall have uniform lengths, and shall be separated by equal spaces.

Mr. PENGELLY gave an account of an analysis which he had made of the daily rainfall at Torquay, for the purpose of determining "the influence of the moon on the rainfall." He thought he had detected such an influence. The dry portion of a lunation extends from the first day before full moon to the first day before the first quarter, and the wet part from the day of the first quarter to the second day before the full moon.

#### TUESDAY.

In consequence of the unprecedented number of papers, the Section met to-day in two divisions, the second division being presided over by Prof. KELLAND, relieved by Dr. GRANT.

#### First Division.

'On Thermo-Electricity,' by Prof. TAIT.—When one junction of a thermo-electric circuit is progressively raised in temperature, while the temperature of the other remains constant, the current increases more and more slowly, then decreases, and afterwards becomes reversed. Sir W. Thomson has explained this by regarding the actual current as the sum of two partial currents in opposite directions. The first partial current depends directly on the difference of temperature between the two junctions; the second depends on the fact that the source of electricity is not only at the junctions but all along the wires, two portions of the same metal at different temperatures behaving like two different metals. The experiments of Prof. Tait consisted in observing the currents generated in two independent thermo-electric circuits, with their hot junctions in one bath and their cold junctions in another, so that the temperature of the junctions were the same for both circuits. The following is Prof. Tait's account of the results:—"Within the limits of

temperature which have been imposed on me by the difficulty of getting wires of the more infusible metals, I have shown that the electro-motive force and the Peltier effect in a thermo-electric circuit are expressed in terms of temperature by parabolic formulae. To carry the investigation further, and also more carefully to verify the parabolic form, I plotted the indications of one circuit in terms of those of another, both having the same temperatures of hot and cold junctions. It is obvious that this will give a very severe test; and, so far as I have yet gone, it is well borne out. By combining, by means of a differential galvanometer, the indications of two separate circuits at the same temperatures, and altering the resistance in one of them so as to make the separate parabolas equal, it is obvious that we get an arrangement in which the electro-motive force is proportional to the first power of the difference of temperatures."

Sir W. THOMSON said it was curious to find how, about fifteen years after its discovery by Prof. Cumming, the fact of reversal at high differences of temperature had now been confirmed with such definite laws of thermal action.

Mr. T. STEVENSON, C.E., exhibited and explained 'A New Reflector for Lighthouses.'—A holophote was taken in which the paraboloidal portion consisted of facets of glass, ground to the proper curve, and silvered on the back. The same mode of construction was proposed for the new kind of apparatus—viz., a differential holophote, which, by means of a single agent, will collect with uniform density in azimuth the whole sphere of diverging rays into any one given cylindrical sector. A mirror had been made of small plane facets, set optically in putty, but the difficulty of making one of continuous surface had been so great that Mr. Stevenson had consulted his friend Prof. Tait, who had by quaternions solved the difficulty.

Prof. TAIT then gave the formulae.

Mr. J. R. NAPIER remarked that sea-going ships ought to be provided with more powerful lights than at present, and Mr. Stevenson's reflector appeared to be eminently suitable for this purpose.

Prof. SWAN read a paper 'On the Wave-Lengths of the Spectra of the Hydrocarbons.'

—Prof. Swan stated that, in 1856, he had communicated to the Royal Society of Edinburgh a paper, published in Volume XXI. of their *Transactions*, entitled, 'On the Prismatic Spectra of the Flames of Compounds of Carbon and Hydrogen.' In his observations on these substances he made use of an arrangement, employed by him still earlier, in 1846, identical with that which, since the publication of Kirchhoff's and Bunsen's researches in spectrum analysis, is familiarly known as a spectroscope, namely, an observing telescope, a prism, and a collimator receiving the light to be examined through a narrow slit at its principal focus. The observations published in 1856 consist of carefully observed minimum deviations of fourteen dark lines of the sun spectrum, and of twelve bright lines of the hydrocarbon spectra, which bright lines were found to be identical in fifteen different hydrocarbons examined. No absolute coincidences between the lines in the solar and terrestrial spectra were observed, except that, long before discovered by Fraunhofer, between the double sun line D and the double yellow line of ordinary flames, now, wherever or whenever it may appear, referred to sodium. The yellow line was generally present in the hydrocarbon spectra; but from a careful quantitative experiment it was ascertained that the 2,500,000th part of a troy grain of sodium rendered its presence in a flame sensible; and the conclusion was then distinctly stated, it is believed for the first time, that whenever or wherever the double yellow line appears it is due to the presence of minute traces of sodium. In this state the observations of 1856 had remained until lately, when Mr. Swan was requested by his friend Prof. C. Piazzi Smyth to compute the wave-lengths of some of



the hydrocarbon lines. As no exact coincidence existed between these and the lines of the solar spectrum, it was necessary to have recourse to some process of interpolation, and that which suggested itself to Prof. Swan was founded upon Lagrange's well-known Interpolation Theorem. In order to verify so far as possible the results, the computation of the wave-lengths of the hydrocarbon lines was repeated by interpolating between different groups of sun lines, and the discrepancies between the numbers so obtained in no case extended beyond the place of units in Angström's scale of wave-lengths, where unity expresses the ten-millionth part of a millimetre.

A conversation then took place, in which Dr. GLADSTONE and Mr. G. J. STONEY took part, chiefly relating to Prof. Swan's discoveries in connexion with the sodium line.—Prof. SWAN said, Fraunhofer long ago discovered the coincidence of the double dark line D with the double yellow line of a sodium flame. What he himself claimed was this: in the hydrocarbon spectrum he found this yellow line coming and going in a manner which made him suspect it to be an intruder; and having found that the presence of an infinitesimal portion of sodium sufficed to render this line visible, he announced that, whenever and wherever this yellow line was found in a spectrum, it was due to the presence of sodium, and he believed he was the first person who ventured to make that announcement.—This claim was allowed by those who took part in the conversation, and Dr. GLADSTONE went on to say that Brewster, at an early date, observed the coincidence between certain bright lines (those of potassium, for example), and dark lines in the solar spectrum; but it appeared to Brewster himself so strange that where the one spectrum gave light the other should give darkness, that they thought the less said about it the better, and some of their observations were accordingly not recorded.

Mr. G. J. STONEY read a short paper 'On the Convenience of Referring the Positions of Spectral Lines to a Scale of Inverse Wave-Lengths.'—Such a scale was more convenient than a scale of direct wave-lengths, because it more nearly resembled what is seen in a spectroscopic, and also because it showed as equi-distant those lines which correspond to the successive harmonics of one and the same fundamental vibration.

Prof. EVERETT suggested that it would be better to call such a scale "a scale of numbers of vibrations."—Prof. MAXWELL stated that Listing had caused several persons of delicate colour-vision to point out the boundaries between the different colours in a spectrum. Their decisions agreed very closely, and were such as would divide a scale of inverse wave-lengths into eight equal portions.—Prof. TAIT said that steps were being taken by the Committee of the Section to have such a map prepared.

Prof. TAIT then stated the substance of a paper, by Mr. Fox Talbot, which had been submitted to referees, who had no doubt as to the value of the suggestions contained in it, but only of their originality. It is 'On a Method of Estimating the Distances of Fixed Stars.'—Suppose a double star, the two constituents revolving about each other, in a plane which passes through the earth. At the moment when they are together, they are approaching or receding from the earth with equal velocities; but when they appear furthest apart these velocities are not equal. These velocities are to be determined by observing the displacement of the lines in their spectra. The difference of these displacements gives the velocity of one star relative to the other; and this, combined with the periodic time, which we can observe, gives the orbit, which again enables us to calculate the distance from the earth.

Mr. W. R. SMITH read a paper, by himself and Mr. T. M. LINDSAY, in which the preference was given to Leucippus and Democritus above Epicurus and Lucretius, as the originators of "the Kinetical Theory of Matter." The systems of the latter introduced the metaphysical element of chance,

and led to materialism. Their expounder, Gassendi, was the leader of modern materialism.

A paper, by Mr. R. A. PROCTOR, 'On the Construction of the Heavens,' was read, and some beautiful star-charts of the northern hemisphere, reduced by photography from larger maps, were handed round. The stars included extend to between the ninth and tenth magnitudes, and number 324,000. Their positions are copied from Argelander's separate maps, and reduced by polar equal-surface projection.

Prof. CLIFFORD followed with a 'Note on the Secular Cooling and the Figure of the Earth.'—One line of argument by which Sir W. Thomson had endeavoured to prove that the earth could not have been habitable for more than 100,000,000 years was founded on the secular cooling of the earth. He proves that after 100,000,000 years from the beginning of the cooling (starting with the earth as a mass of melted rock), the rate of increase of temperature in going downwards would be about what we find it to be—1° Fahr. in 50 feet. Dr. Calvert, in one of the other Sections, had endeavoured to prove that certain elementary forms of life can survive a temperature of over 320° Fahr. If this be so, we are at liberty to suppose that the sea had a temperature of about 320° at the beginning of the period. This, Prof. Clifford found, would only increase the time required by 8 per cent. as compared with an initial temperature of 50°. Another of Sir William's arguments was founded on the friction of the tides. The earth must have been originally rotating much faster than now, its rotation being gradually diminished by tidal friction. The shape of the earth at present is so nearly that which it would have assumed in solidifying at its present rate of rotation, that we cannot allow more than 100,000,000 years. Now it had been suggested (in the first instance by Playfair) that the earth, if initially solid and having any shape whatever, would ultimately come to its present shape; that, on account of its vast size, it would behave like a soft body.

Sir W. THOMSON said it had always appeared to him that the temperature of the surface of the earth must depend solely on the temperature of the sun and of surrounding space. If the sun was so hot as to give a temperature of 320° Fahr. for many million years, the state of things imagined by Dr. Calvert may have existed, as far as physical reasons are concerned. It was satisfactory to find, as Prof. Clifford had shown, that the time required for the earth's cooling was only affected 8 per cent. by such a supposition. As regarded the other point raised, he did not know whether Prof. Clifford argued from elastic yielding, or from detrition. Considering first detrition, on the supposition that the earth did not yield elastically: if the earth had solidified 300,000,000 years ago, what would have been the changes produced by landslips, wearing down by rivers, and other forms of detrition? The earth would have initially a much greater velocity of rotation than at present, and therefore a much greater protuberance at the equator. As the rotation diminished, the sea would run to the poles, and leave a great mountain all round the equator, cutting off all communication between the northern and southern seas. Could this result in the present distribution of land and water? Have we not the evidence of mountains five miles high before us, and have we the right to say that a more gradual slope amounting to ten miles could not survive? The other question, of elastic yielding, is answered in the investigation regarding the tides on an elastic globe. The very existence of the tides proves a considerable degree of rigidity against the deforming influence of the tide-generating forces of the sun and moon; and the accuracy with which calculations of precession and nutation, based on the hypothesis of absolute rigidity, agree with observation, give us very strong evidence of a rigidity so great that the elastic yielding, though not quite insensible, will be very small in proportion to the whole yielding which a fluid globe would exhibit under the action of the same forces. It seems to be established, on scientific evidence, that the earth cannot have been so

far cooled and consolidated as to be fit for such life as we have any samples of at a period of a thousand million years ago, for the one reason that, if this had been the case, its condition now would be a condition proceeding from that of a rigid globe with a protuberance twenty, thirty, or forty miles high at the equator; the substance of which would, in the first place, produce prodigious crushing and disturbance, and afterwards nothing like the present distribution of land and water. This argument gives such a limit as a thousand million years, but other arguments give a closer limit.

Sir W. THOMSON then gave a mathematical paper, entitled 'General Canonical Form of a Spherical Harmonic of the  $n$ th Order.'

#### Second Division.

Dr. BUTS-BALLOT gave a short address 'On the Importance of a Telegraphic Meteorological Station at the Azores.'—He spoke of the importance that a telegraphic station in the midst of the Atlantic would have in giving warning of the approach of storms to the shores of Europe. The cable could be laid from the Azores to the Portuguese coast; but it would not be for the interest of Portugal alone, but of all the European nations, and particularly Great Britain, which had the greatest amount of shipping. He suggested that the Scottish Meteorological Society, which had done great service to meteorological science, should take up the matter, with the view to an international fund being raised to promote the object of his address. He was authorized to say that every encouragement would be given by the Portuguese Government, and the rates would be only 1*l.* per message.

Mr. C. W. SIEMENS said there was no doubt a telegraph station must be got at the Azores, and there should be no difficulty about the money, seeing that the thing was to benefit all Europe.

Mr. RUSSELL read a paper 'On the Inferences Drawn by Drs. Magnus and Tyndall from their Experiments on the Radiant Properties of Vapour, in which he agreed in the main with Tyndall's deductions, pointing out, however, that vapour had no power of transmitting its radiant heat into space. This proposition was supported by arguments from natural phenomena.

Mr. P. BRAHAM gave a description of a set of lenses for the accurate correction of visual defects.

Mr. W. LADD contributed a paper 'On a Respirator for Use in Extinction of Fires.'—It combined the advantages of the charcoal and the cotton-wool respirators. The respirator was intended to be fitted on the heads of firemen, and would enable a fireman to enter into the midst of any smoke, however dense. There was a sufficient protection to the eyes, by means of glasses. The results of an experiment with the respirator had been stated by Prof. Tyndall. In a small cellar-like chamber, furnaces containing resinous pine wood were placed, and the wood being lighted, a dense smoke was generated. In this room, Prof. Tyndall and his assistant, having on the respirator, remained for more than half an hour, when the smoke was so dense and pungent that a single inhalation through the undefended mouth would have been perfectly unendurable; and they might have prolonged their stay for hours. The instrument had since been tested by Capt. Shaw, chief officer of the Metropolitan Fire-Brigade, who had taken the greatest interest in perfecting the instrument, attaching to it suitable hoods.

The Abbé MOIGNO gave a description, similar to that given by him in the Chemical Science Section on Monday, of the Photographic Post in use during the recent war between France and Germany.

The next paper read, which was by Mr. R. SURTON, gave an account of a new photographic dry process, which, it was stated, in the course of a few remarks on the paper, might shortly be of great interest in connexion with astronomical photography.

'Government Action on Scientific Questions,' by Col. STRANGE.—The author set out by remarking on the importance of scientific education. At

present the British Government was totally unfitted to direct such education, and he therefore suggested that two additions should be made to the Ministry, but neither unaccompanied by the other—first, a Minister of Science; and second, a permanent Consultative Council, to advise the various departments through the Minister. His purpose was not to endeavour to uproot the existing system, but to graft upon it additions demanded by experience and the progress of knowledge. Assuming that the Minister would be appointed for his station, parliamentary ability, and political influence, he would need advisers, who should be a permanent, well-paid, and therefore a responsible Council of Science, representing all the main branches of science, the different arms of the military and naval services, commerce, agriculture, and the engineering profession. The Council should be quite independent of political influences. The author went on to state the mode of election to the Council which he proposed, and in which he would give a certain voice to the scientific societies. The duties of the Council would be—1st, to advise the Government on all questions arising in the ordinary routine of administration submitted to it by the various departments; 2nd, to advise Government on special questions, such as the founding of new scientific institutions, and the modification or abolition of old ones; the sanctioning of scientific expeditions, and applications for grants for scientific purposes; 3rd, to consider and decide upon inventions tendered to Government for the use of the State; and, 4th, to conduct or superintend the experiments necessary to enable it to perform these duties. This would not entirely relieve the Government of all responsibility in scientific matters. The advantages to the nation accruing from a sound and comprehensive administration of science were incalculable.

'On Obstacles to Teaching Science in Schools,' by the Rev. W. TUCKWELL.—The author began by referring to the present position of science in the schools of this country, and to the difficulties of head masters in consequence of the absence of science teachers, whose cost, and the cost of appliances, were heavy matters for consideration. There was further the anxious question—How was scientific education to be inserted in the curriculum of an established school? In connexion with this difficulty, he asked whether the day had not arrived when Greek and Latin verse-making might be allowed to disappear and scientific teaching to be substituted? The author briefly stated the good results which might be expected to follow from scientific education, and he concluded by appealing to the Association for help to establish such schools.

The PRESIDENT, in introducing the discussion, said there existed an absolute necessity for a State system of instruction in science.—The Rev. T. G. BONNEY (tutor of St. John's College, Cambridge), addressed himself to the part the Universities had taken in scientific instruction. He thought there was little fear that, for the future, science will receive its due reward. He thought he could speak not only in the name of Cambridge, but of Oxford. The Natural Science Tripos has been instituted for some years, and is growing in importance. He thought there would be no difficulty in getting a supply of masters. He wished we had a probation year, as in Germany, for the recommendation of a tutor was one of the most difficult tasks that falls to a college professor. Unless a man is seen at work in his class-teaching, you cannot form a due idea of him; and he thought this probationary year would be one of the most important educational reforms that could be instituted.—Mr. G. J. STONEY supported the idea of the proposed committee. One of the most valuable works a right-thinking scientific man could do would be to point out the educational advantage of teaching scientific subjects, and what results would be attained by occupying a large portion of the time of boys at school in the study of science. It appeared to him that the great object to be attained in early education is to give a power of right

judgment, and that would be more easily and completely given by scientific study than by almost any other. He did not wish to displace the classics, but he was sure a large class of minds could not be so well trained by confining them to classical studies as if they were put to scientific subjects. 'Some minds, for instance, have a great objection to deal with mathematical subjects, but are very apt to deal with scientific subjects. We should recollect these radical distinctions of mind, and not force all minds into one set groove. He advocated the study of modern languages. The study of such a language as German would be admirable mental training, and might offer to many boys who would be ready to throw themselves into it the same educational advantages as the study of ancient languages.—Dr. WALLIS, of the Bradford High School, said he felt sure teachers and masters generally would be found to welcome any help that might be extended to them in the direction indicated by the Rev. Mr. Tuckwell. He had found that masters need better text-books, and he thought this was a point to which the attention of the proposed committee might be directed. The time of teachers was now so fully occupied, and so many demands were made upon them for explanations, that they require text-books ready to hand.

—Mr. C. HUGGINS, as a teacher of science in one of our public schools, supported the views of the Rev. Mr. Tuckwell. The difficulties met with by such teachers as himself do not arise from the pupils, but from the opposition of the staff of masters to the teaching of science. In one school where he had taught, he was told the head master was induced to appoint a scientific teacher only from outside pressure by the parents of the pupils, and not from his own inclination: therefore the teaching of science was not looked upon with great favour in the school. The next difficulty was to obtain sufficient time from the schoolmasters. Each of the schoolmasters thought he had a right to get out of his pupils as much work as they could do, and thought it rather hard that any of the pupils' time should be occupied in coming to a scientific master. In the school of which he was speaking, he was only allowed to have the pupils for one hour per week. In another the time given was longer, but in that case the scientific department was looked down upon—a fact which rather counterbalanced the relative advantage.—Mr. J. M. WILSON (of Rugby School) agreed with the Rev. Mr. Tuckwell's observations as to the waste of educational power. They had to contend with a long-established system of classical teaching. He did not think it was a very scientific or a very good method of teaching classics, but its uniformity gives it its strength. He wished, therefore, to direct the attention of the Section to that point of uniformity. In science teaching they had no uniformity, and therein was found their weakness. He thought a man who has a genius for teaching science should have facilities given him for communicating his attainments to others. That is one of the subjects upon which a committee could accomplish much good in making known the worth of science teaching by disseminating information. Prof. Huxley gave the objects advocated by this paper his warmest support, and was willing to be on the committee in a consultative way. He did not know how the committee will be formed, but it will be of great importance that men of attainments on this subject should be appointed, and also men who have sufficient leisure to give the subject their full consideration and their deliberate opinion. One real difficulty now experienced was in getting competent examiners for schools.—Mr. PENGELLY urged the establishment in schools of museums of common objects, which would draw out the powers of observation.—Mr. BOYD DAWKINS suggested that a scientific league should be formed of persons interested in teaching science, and that it should have for its object the enforcing the claims of science, and of bringing them before the Government in such a way as could not be resisted. He thought that scientific men—each man working only in his own individual centre—waste an immense deal of power,

simply because they do not throw themselves together, and band themselves together, for one common object. The teaching of science in schools is absolutely necessary if we are to maintain our position on the continent of Europe. If our arts and manufactures are to be in the future what they have been in the past, scientific education must not be in the future what it has been in the past. Hitherto it has been in the hands of a few earnest men, who have had to undergo every kind of obloquy, to endure all manner of sacrifice. Therefore he thought it would now be desirable to inaugurate a kind of scientific league. There was a circular issued last year respecting this suggestion, and he trusted it would not be allowed to drop.—The Rev. H. H. WINWOOD said Section C. had resolved to send a communication to the Committee of Recommendations on this subject. He enforced the observations of previous speakers with regard to the comparative inutility of classical teaching, and said head masters could not, as a rule, be made to depart from the old ruck. Right down in the West of England,—at an out-of-the-way place Edinburgh people knew nothing about, a little place called Bath,—he had introduced to a school a scientific teacher who did not even require to be paid—which was rather a wonderful thing; he simply wanted to get an opening to teach the boys geology or botany. He was told, however, that the school had no vacancy for it. It was to be hoped that head masters might be induced to teach science in their schools.—The Rev. H. MARTIN pleaded for an effort to attain harmony, not antagonism, between science and classica. Owing to the great extension of discovery in science, there would be a difficulty in getting sufficient time for adequate school study, and this difficulty should be met in a spirit of harmony. When co-ordination was attained, something would be done, and not much before.

Mr. W. A. TRAILL described, with the aid of a coloured diagram, a beautiful display of Parhelia, seen by him in County Down, Ireland.

This concluded the business of Section A.

#### SECTION B.—CHEMICAL SCIENCE.

##### MONDAY.

The proceedings commenced with two short notices 'On the Dichroism of the Vapour of Iodine,' and 'On the Action of Heat on Bromine,' by the PRESIDENT (Dr. Andrews); and, in illustration of his remarks, Mr. DEWAR exhibited an experiment, showing the effect of the chemical action of light on the peroxide of chlorine.

Dr. RICHTER followed with a long paper 'On the Chemical Constitution of Glycollic Alcohol, and its Heterologues, as viewed in the new light of the "Typo-nucleus" Theory.'

The 'Report of the Committee on the Utilization of Sewage' was then presented by Mr. GRANTHAM, the chairman. It was divided under the following heads:—1st, Mr. Hope, Experiments on Breton's farm; 2nd, Dr. Corfield, Comparison of results during winter of Croydon, Norwood, and Breton's farm experiments; 3rd, Mr. Hope, Tunbridge Wells and Earlswood experiments; Reports on analysis in connexion with above, by Dr. Corfield; 4th, Dr. Corfield, Upward filtration of Sewage at Ely; 5th, Dr. Corfield, Phosphate process; 6th, Dr. Corfield and Dr. Gilbert, Dry Earth System at Lancaster.

A very spirited discussion was kept up by Messrs. FRANKLYN, SPENCE, LEIGHTON, STANFORD, THORP, and others.

The Abbé MOIGNO made a communication 'On the Photographic Post,' in which he styled Sir David Brewster the father of microscopic photography. He particularly mentioned the labours of Mr. Dancer on this subject, and then described the method adopted during the siege of Paris for printing and circulating despatches and newspapers. He exhibited a film of collodion, a few inches square, on which were 3,500 despatches, and he said, if necessary, one pigeon could bring 50,000 despatches into the invested city.



Dr. BISCHOF read a paper 'On the Examination of Water for Sanitary Purposes,' and presented a series of drawings of the residue obtained by the evaporation of water as seen through the microscope.

Prof. C. R. WRIGHT gave an account of some experiments on the essential oil of orange peel. It had already been shown that this oil consists principally of a hydrocarbon, Hesperidene, of formula  $C_{10}H_{18}$ ; in addition, it is found to contain 2-8 per cent. of an amorphous resin, of formula  $C_{20}H_{30}O_2$ . The hydrocarbon treated with dilute nitric acid yields red fumes,  $CO_2$ , and a brown resin, containing nitrogen and less hydrogen in proportion to the carbon than the original hydrocarbon; by the further action of nitric acid a yellow resin, apparently more oxidized than the former one, is produced, and simultaneously much oxalic acid. By boiling *per ascensum*, hesperidene with sulphuric acid and potassium dichromate,  $CO_2$  is slowly evolved, and acetic acid produced; from which it is inferred that the structure of the hydrocarbon is  $C_1H_3CH(C_3H_{13})$ .

## TUESDAY.

The 'Report of the Committee appointed for the Purpose of Superintending the Publication of Abstracts of Chemical Papers' was read by Dr. THORPE.—The Committee announced that regular Reports of the progress of chemistry have been published since the 1st of April last by the Chemical Society. These Reports have been rendered, as far as possible, complete, by giving abstracts, more or less full, of all papers of scientific interest, and of the more important papers relating to applied chemistry. The abstracts have been made by chemists, most of whom are members of the Society, whose zeal for the science has led them to undertake the work for the small honorarium which the Council has been able to offer. A numerous Committee of Publication has been formed, whose members gratuitously undertake the revision of the proofs and a comparison of the abstracts with the original papers. The Reports are edited by Mr. Watts, each monthly part being bound up with the corresponding number of the *Chemical Society's Journal*. Each volume will be furnished with a full Index, and will give a complete view of the progress of chemistry during the year. The Committee feel that their thanks are due to those gentlemen engaged for having already so far succeeded in accomplishing a task of difficulty and importance, and they hope that their continued exertions will further perfect the details of the scheme, so as gradually to increase the usefulness of the Report. It is right to state that the funds of the Chemical Society available for the purpose of the Report, although so opportunely aided by a grant of 100*l.* from the British Association, were insufficient to defray the necessary expenses, and that voluntary contributions to the amount of upwards of 200*l.* have been received towards the cost of publication for the first year, up to April, 1872. There is reason to believe that the expectation entertained of the usefulness of these Reports will be fully realized by their continuance on the present system, and that they will be found largely to conduce to the progress of the science wherever the English language is spoken.

Dr. THORPE read a paper 'On the Constitution of some of the Oxichlorides of Vanadium discovered by Roscoe.'—The author has unsuccessfully attempted to prepare the corresponding phosphorus oxichlorides; when phosphoryl trichloride is heated with zinc in a sealed tube, phosphorus trichloride, among other products, is obtained. He has also prepared sulphochloride of phosphorus by heating pentachloride of phosphorus with phosphorus pentasulphide.

Mr. P. MUIR communicated an analysis of a sulphide of antimony from New Zealand. It was beautifully crystalline and almost chemically pure, containing only a trace of arsenic and iron.

Mr. J. DALZELL has proved the existence of sulphur dichloride by a repetition of the experiments of Hübner and Gueroult.

Dr. WRIGHT gave a *résumé* of his researches on the derivatives from Codeia, recently communicated to the Royal Society.

The following papers were also read: by Mr. TICHBORNE, 'On the Dissociation of Molecules by Heat,'—by Mr. J. Y. BUCHANAN, 'On the Rate of Action of Caustic Soda on a Watery Solution of Chloroacetic Acid,'—by Prof. APJOHN, 'Some Remarks upon the Proximate Analysis of Saccharine Matters,'—by Dr. GLADSTONE, 'On Crystals of Silver,'—by Mr. BRAHAM, 'On the Crystallization of Metals by Electricity,'—by Mr. J. S. HOLDER, 'On the Iron Ores of Antrim,'—by Prof. MASKELYNE, 'On Dufrenite and a New Mineral from Cornwall,' and 'On Localities of Diopside,'—by Dr. GOODMAN, 'On Films,'—by the Rev. H. HIGHTON, 'On a Method of Preserving Food by Muriatic Acid,'—by Mr. WANKLYN, 'On the Constitution of Salts,'—by Mr. HARKNESS, 'On a Method of Testing Wood Naphtha.'

## SECTION C.—GEOLOGY.

The papers read in this Section on SATURDAY, MONDAY, and TUESDAY were of a most miscellaneous character, some of the more interesting and important being on palæontological subjects.

Mr. DAWKINS's paper, 'On the Relation of the Quaternary Mammalia to the Glacial Period,' gave a clear outline of a very puzzling question. He divided these mammalia into five distinct groups, the first of which consists of those now living in the temperate regions of Europe and America, among which the more important were the grizzly bear, the lynx, the bison, and the wild-boar. The second group comprises those animals which are now restricted to cold regions—the glutton, the reindeer, the musk sheep, and the tallow-hare. They constitute the Arctic division of Quaternary mammalia, and imply the former prevalence in England of a cold climate. The third group, on the other hand, consisting of those animals which are now only found in hot regions, such as hippopotamus, &c., gives evidence of a warm climate. Mr. Dawkins believed that the only mode of reconciling the apparent discrepancy of this evidence with that furnished by the preceding group, was to suppose that at the time these animals lived the winter cold and summer heat were strongly contrasted; so that in summer the animals which are now confined to warm regions found their way northward, while in the winter time the Arctic forms travelled southwards. The fourth group consists of the extinct forms—the cave-bear, the mammoth, &c.; and the fifth group embraces those animals whose remains occur both in Pliocene and Quaternary deposits. The interest centred more especially in the Arctic group; and the author thought there could be no doubt that the animals belonging to this group were in occupation of those areas in Britain where their remains are now met with, at a time when glaciers and snow-fields covered the higher levels of the country. This period might be referred to the latest sojourn of the glaciers in our country.

In the discussion that followed, Mr. J. GEIKIE remarked that, from the evidence supplied by the drift-beds of Scotland, it was not unlikely that some of the English deposits containing Arctic mammalian remains might yet have to be classed with the older period of glaciation, namely, that of the lower boulder-clay. He showed that during the great glacial epoch there had been several oscillations of climate, the less Arctic periods being represented by freshwater beds with mammalian remains, such as *Bos primigenius*, the reindeer, &c.

Another interesting palæontological paper was one by Dr. MUIR, 'On the Systematic Position of the *Sivatherium giganteum*.'—The paper was illustrated by a number of diagrams, among which was a large cartoon giving a 'restoration' of this remarkable form. The author was inclined to place the *Sivatherium* in the family Antilocapridæ, although he thought there were many reasons for taking it as the centre type of a family, the Sivatheriidae.

Mr. WOODWARD's paper, 'On Relics of the Carboniferous and other Land Surfaces,' contained an interesting summary of all the 'fossil' evidence he could gather together with regard to old land surfaces, the object of the paper being to show how

far there was proof for a continuity of terrestrial conditions having obtained from the earliest geological epochs down to Quaternary times. The author treated successively of the Tertiary, Secondary, and Palæozoic strata, and the indications which certain of their fossil contents gave for the appearance of land during successive periods, and remarked that traces of land could be detected even far down in Silurian strata, the graphites of which might possibly owe their origin to the destructive distillation of old Silurian coal-beds.

Prof. TRAQUAIR contributed some notes 'On Additions to the Fossil Vertebrate Fauna of Burdiehouse, near Edinburgh.'—He described a new species of *Phaneropleuron* (*P. elegans*), from the Burdiehouse limestone. The genus was also new to the Carboniferous formation, the single previously known species (*P. Andersoni*) being from the Upper Old Red Sandstone of Dura Den, Fifeshire. Prof. Traquair also called attention to a *Labyrinthodont* skull, seven inches long, from the same locality, probably belonging to Huxley's genus *Pholidogaster*; but more minute description the author reserved for another occasion. The Burdiehouse limestone is the lowest geological horizon from which the remains of *Labyrinthodont* Amphibia have been as yet described.

A number of fossils were exhibited to the Section by several indefatigable collectors. Mr. C. W. PEACH showed a considerable variety from several localities, chiefly in the neighbourhood of Edinburgh. They consisted for the most part of fish remains, some of which belonged to new species. A number of fine coal plants were also exhibited, one beautiful specimen of *Antholites* showing the fruit attached.—A very large plate of the head of *Rhizodus* was laid on the table by Dr. SMITH: the specimen came from Gilmerton, and is certainly one of the finest yet met with.—Dr. BRYCE brought before the Section a number of fossils from the Durness limestone, Sutherland, some of which were better preserved than those previously obtained from the same locality by their discoverer, Mr. C. W. Peach.—Among other interesting fossils exhibited was one of the earliest forms of trilobites, shown to the Section by Prof. HARKNESS.—Mr. WOODWARD also showed a new Arachnid, from the coal-measures of the Dudley coal-field; and the Rev. W. S. SYMONDS exhibited a new onchus spine, from the Lower Old Red Sandstone of Hay, Breconshire.—Mr. J. MILLER also brought a number of specimens before the Section, and read a paper to show that the so-called Hyoid plate of *Asterolepis* is not the *hyoid*, but a *dorsal* plate.

Among the Reports received were Dr. DUNCAN's, 'On the British Fossil Corals,' and one 'On Sections of Fossil Corals,' by Mr. THOMSON.

An interesting paper was read by the Rev. J. F. BLAKE 'On the Yorkshire Lias and the Distribution of its Ammonites.'—The author called attention to the distribution of the ammonites of the Yorkshire lias in zones, and showed their correlation with those of England generally, as well as Germany and France.

Mr. ETHERIDGE entirely agreed with the author in his views, and commented upon the value of the group in the determination of different parts of the lias.

Mr. J. E. TAYLOR, in a paper 'On the Later Crag Deposits of Norfolk and Suffolk,' drew attention to the close affinity of the upper part of the Red Crag with the Chillesford beds, and noticed those species common to the two series.

Dr. MOFFAT's paper, 'On Geological Systems and Endemic Diseases,' gave rise to some discussion. Dr. Moffat said that, in a paper which he read last year, he stated that the district in which he lived consisted geologically of the Carboniferous and the New Red or Cheshire sandstone systems; and that the inhabitants of the former were engaged in mining and agriculture, and those of the latter in agriculture chiefly. Anæmia with goitre was prevalent amongst those on the Carboniferous system, while it was almost unknown among those on the Cheshire sandstone, and phthisis was also more prevalent among the

former than the latter. As anæmia was a state in which there was a deficiency of oxide of iron in the blood, he had examined chemically the relative composition of wheat upon a soil of Cheshire sandstone, Carboniferous limestone, millstone grit, and a transition soil between the Cheshire sandstone and the grit. The analysis showed that wheat sown upon Cheshire sandstone yielded the largest quantity of ash, and that it contained a much larger quantity of phosphoric acid and oxide of iron than that grown upon the other formations. The analysis also showed that wheat grown upon the Carboniferous system was deficient in phosphates or nutritive salts. With the view of ascertaining whether the bread of those who dwelt upon the two systems was relatively as deficient in the nutritive elements as the wheat, he collected twenty samples of bread used by twenty different families living on each system, and the analysis afforded results as conclusive as the examination of the wheat. The deficiency of the nutritive salts in the bread compared with those in the wheat was remarkable, no doubt owing to the removal of the bran from the flour with which the bread was made. From statistics it was found that the number of deaths from anæmia was greater on the Carboniferous than on the New Red Sandstone system at all elevations, and that there was a greater number of deaths from cancer on the Red Sandstone than on the Carboniferous system. The number of deaths from struma diminished with the increase of elevation. On the Carboniferous formation, on both sides of the estuary of the Dee, at a mean height of 30 feet, the number of deaths per 1,000 of population from struma was 14 and 22 greater than it was on the Cheshire sandstone of nearly the same elevation; while at a mean height of 500 feet it decreased to only three above it. This diminution with elevation in the death-rate of strumous persons he attributed to meteorological causes, the chief of which he believed to be atmospheric ozone. The practical deductions to be drawn from this inquiry were, that all young persons living on a Carboniferous formation having symptoms of incipient goitre and anæmia ought to be moved to a soil upon Red Sandstone; that persons of strumous habit ought to reside upon sandstone of an elevation of at least 800 or 1,000 feet above the sea; and that both classes of persons should live upon food—both animal and farinaceous—which contains the maximum quantity of oxide of iron and the phosphates or nutritive salts.

Prof. YOUNG said that those who undertook investigations of this kind should limit their examinations to one class of diseases, or to a group of diseases sufficiently distant pathologically as not to interfere with one another.—Mr. G. A. LEBOUR said that in a part of Northumberland with which he was well acquainted, goitre was restricted to a region of Carboniferous limestone.—Sir R. GRIFFITH, however, remarked that in those districts of Ireland where there was plenty of limestone, goitre was unknown.—A member of the Section thought that Dr. Moffat's deductions were mere coincidences. The character of the food was very fluctuating, depending as it did on the state of the markets and crops, and it was also a fact that the people were largely fed with food which was imported.—Dr. MOFFAT, in reply, said that goitre was found to decrease after the introduction of a different kind of food. He also mentioned that the sheep in that district were peculiarly subject to anæmia.

The PRESIDENT (Prof. Geikie) gave an account of the Progress of the Geological Survey of Scotland. The total area surveyed was 6,000 square miles. Of this area, 3,116 square miles had been published on the one-inch scale, and three sheets, representing in all 632 square miles, are now in course of being engraved. Fifty-seven sheets of the six-inch map had now been published. Prof. Geikie stated that until three years ago the mapping of the Lower Silurians of the southern uplands had been unsatisfactory, owing to the want of any continuous recognizable section from which the order of succession among the strata could be ascertained, and to the great scarcity of organic

remains. But the more recent work of the Survey among the Leadhills had at last given them the means of unravelling the physical structure and stratigraphical relations of the uplands of the south of Scotland. The other geological formations were then briefly referred to, and the general results of the Survey's work stated.

Messrs. C. LAFWORTH and J. WILSON had a paper 'On the Silurian Rocks of Selkirk and Roxburgh,' and another 'On the Graptolites of the Gala Group.'—They proposed a classification of the rocks under certain local names, and exhibited a number of specimens of graptolites, some of which appeared to be of new species.

A short paper, by Mr. D. GRIEVE, 'On Fossiliferous Strata recently exposed at Lochend, near Edinburgh,' was interesting, as it proved the position of the Burdiehouse beds at that locality, where their presence had formerly only been conjectured by Prof. Geikie.—Several other local papers were read, but none of them presented any features of interest or importance.—Attention, however, must be called to Mr. MILNE-HOME's notice of 'A Scheme for the Conservation of Remarkable Boulders in Scotland, and for the Indication of their Position on Maps.' He mentioned that even within the limits of his own knowledge, many had been broken up for road-metal and building purposes; and referred to the action taken by the Natural History Societies of Dauphiné and Switzerland with a view to preserving the erratic blocks and boulders in those countries. He hoped that a similar movement would be commenced in Scotland. It is satisfactory to know that the British Association has been induced to grant a sum of money for the purpose mentioned by Mr. Milne-Home. The conservation of the boulders, however, is not to be restricted to Scotland, but will be looked after in England and Ireland also.—The subject of boulders and boulder-drift was also brought before the Section by Sir R. GRIFFITH, who read a long paper 'On the Boulder Drift and the Esker Hills of Ireland'; and likewise 'On the Position and Composition of Erratic Blocks in that Country.'—Mr. MILNE-HOME stated that ridges of sand and gravel similar to those described by Sir Richard were well known to occur in Scotland, and one was even now being formed in the Firth of Forth. This ridge went by the name of the Whale's Back, and was about 2½ miles in length.—Another drift paper was one by the Rev. J. GUNN, 'On the Agency of the Alternate Elevation and Subsidence of the Land in the Formation of Boulder Clay and Glaciers, and the Excavation of Valleys and Bays.' The author of this paper appeared to be of opinion that the boulder-clay has been deposited in the sea, and that it indicated the former prevalence of a temperate climate, because an increased area of sea would tend to induce warmth. He thought also that valleys might be carved out by the sea, and mentioned that off the coast of Great Yarmouth such was being done to a depth of eighteen fathoms.

The list of papers before the Section was so long that many were read only in the briefest abstract. Among these was a paper 'On the Origin of Volcanoes,' in which the author, Mr. P. W. S. MENTATH, seemed to consider the presence of organic remains in the strata as one of the primary causes of volcanic energy.—Mr. W. S. MITCHELL was also compelled, from want of time, to give but a brief outline of his two papers, the first of which was one 'On the Leaf-Beds of the Lower Bagshot Series,' and the other, 'Some Further Remarks on the Denudation of the Bath Oolite.' In this latter paper Mr. Mitchell maintained that the hills of Bath oolite were simply old coral reefs, and did not owe their form to denudation—an opinion in which Mr. ETHERIDGE and Mr. HUGHES could not concur.

Other papers read were 'On the Coal-Beds of Panama, in reference mainly to their Economic Importance,' by the Rev. Dr. HUME, 'On the Geology of the Nursioak Peninsula and Disco Island, in North Greenland,' 'On Hydrogeology,' by the Abbé RICHARD. This last paper was read in French. The author was of opinion that rivers and water-courses of all sizes existed below

the surface of the earth, but, although concealed, they yet revealed their presence by certain geological signs. The knowledge of these revealing signs formed a science, which he called Hydrogeology. But this law was his property, and for the present he intended to keep it a secret! He mentioned a number of instances where he had applied his theory with success. He was of opinion that the water was gradually sinking down and disappearing from the surface of the earth! No divining-rod was exhibited.

On Thursday, upwards of eighty ladies and gentlemen, under the leadership of the President, visited the coast-line of Berwickshire. The unconformity of the Upper Old Red Sandstones upon the vertical Lower Silurian rocks at Siccar Point was first inspected; the party subsequently visiting the wild coast-cliffs at Fast Castle, where the numerous folds into which the Silurian rocks are thrown are finely exposed. The weather was highly favourable.

#### SECTION D.—BIOLOGY.

##### FRIDAY.

##### Department of Anatomy and Physiology.

'On the Placentation of the Cetacea,' by Prof. TURNER.—An abstract of this paper is published in the last number of the *Journal of Anatomy*, and the whole memoir, with plates, will be given in the *Transactions of the Royal Society, Edinburgh*. Mr. Turner confirms the observations of previous writers, and describes the diffused villi in great detail.

'On the Ciliated Condition of the Inner Layer of the Blastoderm in the Ova of Birds, and in the Omphalomesenteric Vessels,' by Mr. B. T. LOWNE.—He wished to express great caution, because the number of observations which he had had the opportunity of making were too small to arrive at definite results free from error; and he is still pursuing the inquiry. From certain currents and from the very marked circulation in the omphalomesenteric vessels, he was inclined to believe that certain tracts on the inner surface of the blastoderm to the epithelium lining the vessels of the yolk are ciliated. He had seen the currents most distinctly in the embryo between five and six days old, but had observed them at earlier and later periods. He expressed a belief that he had seen the cilia, but stated that the difficulties of the search were such as to indicate the necessity for great caution. He recognized great difficulty owing to the existence of physico-chemical currents, especially convection currents, and those due to capillarity. The observations were made with a Ross ¼ object-glass, and a hot stage, at a temperature of 100° Fahr.

'On some Rudimentary Structures recently met with in the Dissection of a large Fin-Whale,' by Prof. STRUTHERS.—The whale was a specimen of the Razor-back (*Balenoptera musculus*), sixty-four feet in length. It was found dead in the North Sea, off Aberdeen, and towed into Peterhead. Searching for a rudiment of the hind limb, the author found it represented by a bone attached by ligaments to the external process of the pelvic bone. He found a sixteenth pair of ribs, the additional pair occupying the position of sternal rather than of vertebral ribs, and were connected to the fifteenth pair by an external intercostal muscle. The first rib had articulated to it a capital process, four to five inches in length. The flexor and extensor muscles of the fingers were carefully dissected. The muscles found were the homologues of the following muscles in man: flexor carpi ulnaris, flexor profundus digitorum, flexor longus pollicis, extensor communis digitorum. The flexor carpi ulnaris was inserted into a distinct and movable pisiform cartilage. These muscles the author regarded as rudimentary structures, whose function was not extinct, but low; not to be explained by notions of final cause or of so-called type, but by inheritance and the influence of function,—the one, as part of a great scheme of evolution, accounted for their existence,—the other, by fitness and use, had preserved them from becoming extinct.



Prof. HUMPHRY read a paper 'On the Caudal and Abdominal Muscles of the Cryptobranch.'

Sir DUNCAN GIBB read a paper 'On the Uses of the Uvula,' in which he gave some new facts of interest, discovered through experiments upon the soft palate of a female who had lost the bones of her nose.

Another paper by Sir DUNCAN GIBB was 'On Abnormalities of the Larynx of a Congenital Nature,' in which he described one of absence of the arytenoid cartilages, another of the epiglottis shaped like a trefoil leaf, and two others of fissures of the epiglottis.

#### Department of Anthropology.

'Ancient Hieroglyphic Sculptures,' by Lieut.-Col. FORBES LESLIE.

'On an Inscribed Stone at Newhaggard, in the County of Meath,' by Dr. E. A. CONWELL.

'On the Order of Succession of the several Stone Implement Periods in England,' by Mr. J. W. FLOWER.

'On the Inhabitants of the Merse,' by Dr. J. BEDDOE.

'On the Atlantean Race of Western Europe,' by Mr. J. W. JACKSON.

'On the Antiquity of Domestic Animals,' by Mr. G. W. BOYD DAWKINS.

#### Department of Zoology and Botany.

'On the Hydrographical System, and the Fresh-water Fish of Algeria,' by Col. PLATFAIR.

Dr. J. A. SMITH exhibited the Skull of an Elk found in Berwickshire.

Mr. C. W. PEACH read a paper 'On the said-to-be Tailless Trout of Islay,' and exhibited some specimens.

'Note on *Trachypetia bufo*, White—a remarkable Grasshopper inhabiting Southern Africa,' by Mr. R. TRIMEN.

'On Specimens of Fossil-wood from the Base of the Lower Carboniferous Rocks at Langton, Berwickshire,' by the Rev. T. BROWN.

'Onso-called Mimicry in Plants,' by Mr. W. W. T. DYER.—The author said, "In all large natural families of plants there is a more or less distinctly observable general habit or *facies*, easily recognizable by the practised botanist, but not always as easily to be expressed in words. The existence of such a general habit in Leguminous and Composite plants is familiar to every one. What have been hitherto spoken of as *mimetic* plants are simply cases where a plant belonging to one family puts on the habit characteristic of another. This is entirely different from mimicry among animals, inasmuch as the resembling plants are hardly ever found with those they resemble, but more usually in widely different regions. *Mutisia speciosa*, from western South America, a Composite, has a scardent leguminous habit, closely agreeing with that of *Lathyrus maritimus* of the European shores. In the same way, three different genera of ferns have species (found in distant parts of the world) indistinguishable in a barren state. The term Mimicry seems objectionable in these cases, and I propose Pseudomorphism as a substitute. As to the cause of the phenomenon, I can only suggest that the influence of similar external circumstances moulds plants into the similar form most advantageous to them. An illustration is afforded by the closely resembling bud scales which are found in widely separated natural orders of deciduous trees as modifications of stipules. I do not, however, think that the moulding influence need always be the same. I believe that different external conditions may produce the same result; in this respect they may be called analogous. Several identical plants are found on the seashore and also on mountains. The reason is, I believe, that they are equally able to tolerate the effect of soda salts and also of mountain climate; the tolerance of either unfavourable condition gives them the advantage over less elastically constituted plants, and the two are therefore analogous in their effect."

An animated discussion followed the reading of the paper.

'On the Development of Fungi within the Thorax of Living Birds,' by Dr. MURIE.

'Action of Heat on Germ Life,' by Dr. CRACE CALVERT.—It has hitherto been assumed by the advocates of the theory of spontaneous generation that a temperature of 212° Fahr., or the boiling point of the fluid operated on, was sufficient to destroy all protoplasmic life. To determine this point experiments were made with solution of sugar, hay infusion, solution of gelatine, and water that had been in contact with putrid meat. To carry out these experiments, the author prepared a series of small tubes, made of very thick well annealed glass, each tube about 4 centimetres in length, and having a bore of 5 millimetres. The fluid to be operated upon was introduced into them, and left exposed to the atmosphere for a sufficient length of time for germ life to be largely developed. Each tube was then hermetically sealed, and wrapped in wire gauze. They were then placed in an oil bath, and gradually heated to the required temperature, at which they were maintained for half an hour. The sugar solution was prepared by dissolving one part of sugar in ten parts of common water, and then exposed to the atmosphere all night, so that life might impregnate it, then placed in tubes and allowed to stand five days. Some of the tubes were kept without being heated, others heated to 200°, 300°, 400°, and 500° Fahr. respectively. After being kept twenty-four days, the contents of the tubes were microscopically examined. In the solution not heated much life was seen, at 212° a great portion of the life had disappeared, at 300° the sugar was slightly charred but the life not entirely destroyed, while at 400° and 500° the sugar was almost entirely charred, and no trace of life observed. A small black vibrio observed resists the high temperature and all chemical solutions. The hay infusion was made by macerating hay in common water for one hour, filtering the liquor, and leaving it exposed to the atmosphere all night, when it was sealed in the small tubes. The results were examined twenty-four days after being heated. In this case, as in the sugar solution, life was observed in the solutions heated to 200° and 300° Fahr., while in those heated to 400° and 500° Fahr. life was destroyed. In the solution not heated fungus matter was observed, while none appeared in any of the heated solutions. A solution of gelatine, of such strength that it remained liquid in cooling, was exposed to the atmosphere for twenty-four hours, and introduced into the small tubes, which were sealed and heated. The fluids were examined twenty-four days after being heated. The animalcules in this case were principally of a different class to those observed in the two preceding cases, and this class were injured at 100° Fahr.; at 212° a considerable diminution in the amount had taken place; whilst at 300° all life was destroyed. Water was placed in an open vessel, and a piece of meat suspended in it until it became putrid. This fluid was placed in the usual tubes, heated, and the contents examined after twenty-four days. In this case life was still observed at 300° Fahr., while at 400° it had disappeared. Parts of the putrid meat solutions that had been heated were mixed with albumen, to ascertain whether they still possessed the power of propagating life, the result being that up to 300° Fahr. life and its germs had not been destroyed, whilst at 400° they had. Putrid meat liquor was exposed for twenty hours to a temperature ranging from the freezing point to 17° below that point. Immediately after melting the ice the animalcules appeared languid and their power of locomotion was greatly decreased, but in two hours they appeared as energetic as before.

'On Spontaneous Generation, or Protoplasmic Life,' by Dr. CRACE CALVERT.—The object of the inquiry was to ascertain if the germs existing or produced in a liquid in a state of fermentation or of putrefaction could be conveyed to a liquid susceptible of entering into these states. An essential point in the conduct of the investigation was the preparation of pure distilled water. By employing an apparatus through which a gas could be passed to displace the air, and adding to the water to be distilled a solution of potash and permanganate of potash, he obtained a water which, after three or

four distillations, was found to be free from life. The gas employed in the first three series was hydrogen, and the water was kept in the apparatus till wanted, to prevent any contact with air. The water having been kept free from life for seventeen days, was introduced into twelve small holes, and left exposed to the atmosphere for fifteen hours, when the tubes were closed. Every eight days the tubes were examined. On the first and second examination no life was observed, but the third discovered two or three black vibrios in each field. A second series of experiments was made, placing the water in the tubes near putrid meat for two hours, at a temperature of 21° to 26° C. Six days after, some of the tubes were examined and life observed; showing that being placed near a source of protoplasmic life the water had in two hours absorbed germs in sufficient quantity for life to become visible in one-fourth the time required in the first experiment. After six days a slight increase of life was noticed, but no further development could be afterwards seen. In a third series of experiments, albumen was added to the water. In this case life appeared in five days, and a considerable increase in ten. Albumen, therefore, facilitated the development of life. The quantity of life produced in the above experiments being comparatively small, some fresh water was distilled, oxygen being substituted for the hydrogen in the apparatus; and a fourth series of experiments resulted in showing that although oxygen appears to favour the development of germs, it does not favour their reproduction. When the weather had become much warmer and a marked increase of life in the atmosphere had taken place, some of the albumen solution employed in the above experiments was left exposed in tubes to its influence, when a large quantity of life was rapidly developed, and continued to increase, proving the increase to be due not merely to reproduction, but to the introduction of fresh germs. As no life appeared in that portion of the distilled water remaining in the apparatus before mentioned, which was examined from time to time, whilst it appeared in all the solutions made with it, and impregnated by their exposure to the atmosphere, it is obvious that germs are necessary to the production of life.

#### SATURDAY.

##### Department of Anthropology.

'On the Lapps,' by Dr. R. KING.

'On the Discovery of Flint Implements in Egypt, at Mount Sinai, at Galgala, and in Joshua's Tomb,' by the Abbé RICHARD.

'On Bones and Flints found in the Caves at Mentone, and in the adjacent Railway Cutting,' by Mr. M. MOGGIDGE.

'On the Classification of the Palæolithic Age, by means of the Mammalia,' by Mr. G. W. BOYD DAWKINS.

'On Human and Animal Bones and Flints from a Cave at Oban, Argyllshire,' by Prof. W. TURNER.

'On Megalithic Circles,' by Lieut.-Col. FORBES LESLIE.

'On Implements found in King Arthur's Cave, near Whitchurch,' by the Rev. W. S. SYMONDS.

'Is the First Stone Age of Lyell and Lubbock as yet all Proven? Is it anything beyond a Myth?' by Mr. W. D. MICHELL.

#### MONDAY.

##### Department of Anatomy and Physiology.

Dr. A. GAMGEE read a 'Report on the Heat Generated in the Blood during the Process of Arterialization.'—He reviewed the various opinions on the subject which had been entertained, and noticed the experiments of Dr. Davy, which he said were probably valueless. On the other hand, Dr. Christison, in his accurate experiments, had ascertained heat was not materially involved during the process of arterialization. The specific heat of blood was absolutely the same as that of water. Dr. Gamgee described experiments made by himself, several of them in conjunction with Prof. Tait. The earlier experiments he made were unsatisfactory, and no positive proof was obtained of the heating of blood when it absorbs oxygen.

He then gave a description of experiments made this year with a complicated but improved apparatus. The results were, that an amount of shaking might be performed as to arterialize blood without the temperature being affected; when venous blood was agitated with hydrogen, no heating of the blood resulted, but there was always a slight evolution of heat when the blood was shaken with oxygen.

Dr. J. CHIENE read a paper 'On an Experimental Inquiry into some of the Results of Inoculation in the Lower Animals.'—He noticed cases in which cancer had been introduced by inoculation, and described the mode in which he had conducted his experiments.

'Remarks on the Scheme of Dietaries in the Workhouses of England and Wales,' by Dr. E. SMITH.

'On the Restoration of the Tail in *Protopterus annectens*,' by Prof. TRAQUAIR.—Prof. Traquair described two specimens of *Protopterus annectens*, in which the external configuration and internal structure rendered it evident that a considerable portion of the tail had been broken off, and that in the one case a less, and in the other a greater amount of restoration had taken place. In the first specimen, which measured 8½ inches in length, the body was truncated abruptly 3½ inches behind the origin of the ventral fins. This truncated termination of the body was fringed by a delicate membrane, projecting half an inch backwards in the middle, and containing a pointed central axis. On dissection the abrupt truncation was equally obvious in the internal parts, and the fringing membrane, with its axis, was evidently a commencing restoration of the injured tail, the central axis containing a minute newly-formed notochord, lateral muscles, and spinal cord, but there was as yet no new development of neural or hæmal arches, spines, fin-supports, fin-rays, or scales. In the second specimen, which measured 9½ inches in length, and had evidently been truncated or mutilated at a distance of about 7½ inches from the tip of the snout, or 1½ inch from the origin of the ventral fins, the restorative process had proceeded to a much greater length. Although the boundary between the old and new textures was sufficiently indicated on the outside of the fish, by the sudden diminution in the thickness of the specimen and in the size of the scales, the outline of the posterior extremity of the animal was very well restored, though the whole tail was still proportionately shorter than if no mutilation had taken place. The restored portion of the tail measured 2½ inches in length, and on dissection showed not only, as in the former case, a reproduction of the notochord, but also of the neural and hæmal arches, spines, and fin-supports, these elements remaining, however, entirely cartilaginous, and being much more irregularly disposed than in the normal tail. They also cease to be traceable after 1½ inch from the commencement of the new portion of the tail, though the notochord proceeds to its ultimate filiform termination. In addition the spinal cord, the lateral muscles, and the fin rays and their muscles were in this specimen reproduced as well as the scales on the external surface. Both externally and internally the line of demarcation between the old and new textures was distinctly seen.

'On the Morbid Appearances noticed in the Brains of Insane People,' by Dr. J. B. TUKE and Prof. RUTHERFORD.—Dr. Tuke pointed out the importance of localizing brain function, and that the means to this end at the disposal of the physiologist were nearly exhausted. Comparative anatomy had done its work; and experimentation, although it had done much to demonstrate certain leading facts of importance, had left much which was doubtful, and more that it had not attempted to explain. Moreover, sources of fallacy existed in this method of inquiry from the difficulty which existed of localizing artificial injuries, and of reaching deep-seated portions of the brain. Disease, however, injured in a finer and more delicate manner than the knife, and it was held that much might be elicited regarding the functions of the brain by observing the parts of the organs implicated in

disease, and the perversions of the nervous system which are associated with them. It being generally acknowledged that the intellectual powers are manifested through the grey matter of the cerebrum; and as in insanity these faculties were impaired, exaggerated, or perverted, the authors asserted a belief that by examining the brains of the insane a hope existed of discovering a road for arriving at a solution of the functional difficulty. The time had passed when the terms mental disease, insanity, or madness, conveyed to the minds of physicians the idea that the psyche, the mind or its faculties, were the entities which were the subject of disease. By a process of ratiocination rather than of demonstration, the pathologist had arrived at the conclusion that abnormal physical manifestations are dependent upon primary or secondary morbid changes in the nerve tissue; that insanity is a symptom of disease, not a disease itself; and that in the brain the *materies morbi* must be looked for. Six years ago the authors commenced a systematic microscopic examination of the brains of the insane, and with this most important result, that in every single instance a marked departure from healthy structure was observed. The process by which the brain matter was made fit for the microscope was related, also a list of twelve different parts of that organ which had in a majority of the cases been examined. The morbid appearances may be classified under the following heads:—Changes—1st, in the neuroglia; 2nd, in the nerve cells; 3rd, in the nerve fibre; 4th, in the blood-vessels; 5th, granulation in surface of cerebral convolutions, &c.; and, 6th, amyloid and colloid bodies. After describing the various forms of disease, which were illustrated by diagrams and microscopic sections, the paper concluded with the following statements:—

"We are not prepared to designate the individual parts of the brain specially affected in different forms of insanity; but we may say generally, that the corpora striata are the portions most frequently found affected, and that the cerebellum is the organ least frequently subject to disease. Further, that the white matter is much more liable to evident structural morbid change than the cortical substance in comparatively recent cases; and that where the intellect has been in abeyance for prolonged periods, the structure of the grey matter of the cerebral convolutions is difficult of demonstration, the layers are found indistinct, as the cells are few in number and generally small in size. We do not wish it to be thought that we have found in cases of insanity any changes in the cerebrum which may not be found in other parts of the central nervous system in diseases not involving the intellect. The seat of these morbid conditions is the great point to be considered in the different cases; and in this direction we propose immediately to direct our attention, by analyzing the series of microscopic sections at our command, and by carefully comparing the physical signs observed during life with pathological conditions. The great conclusion to which our researches have as yet led us is, that in the fifty-three cases of chronic insanity which we have examined, we have found distinct structural changes in the brain of each. This in itself is a fact having a most important bearing on the physiology of the brain, and one which, if followed up, may be reasonably expected to dissipate much of the mystery which hangs over the functions of its various parts. Our object in bringing this paper before the Association is the hope of enlisting others in an inquiry which is so vast that we feel a host of investigators will be needed to prosecute it."

#### Department of Anthropology.

'On Some Indications of the Manners and Customs of the early Inhabitants of Britain, deduced from the Remains of their Towns and Villages,' by Mr. J. S. PHENÉ.

'On an Expedition for the Special Investigation of the Hebrides and West Highlands, in search for Evidences of Ancient Serpent-Worship,' by Mr. J. S. PHENÉ.

Mr. C. STANILAND WAKE read a paper, entitled 'Man and the Ape.'—In this paper the author

referred to the agreement in physical structure of man and the ape, and to the fact that the latter possessed the power of reasoning, with all the faculties necessary for its due exercise. It is incorrect to affirm that man has no mental faculty other than what the ape possesses. He has a spiritual insight or power of reflection, which enables him to distinguish qualities and to separate them as objects of thought from the things to which they belong. All language is in some sense the result of such a process, and its exercise by even the most uncivilized peoples is shown in their having words denoting colours. The possession by man of the faculty of insight or reflection is accompanied by a relative physical superiority. The human brain of man is much larger than that of the ape, and he has also a more refined nervous structure, with a naked skin. The author observed that the size of the brain was the only physical fact absolutely necessary to be accounted for, and this could not be done by the hypothesis of natural selection. Mr. Wallace's reference, on the other hand, to a creative will really undermines Mr. Darwin's whole hypothesis. After referring to the theories of Mr. Murphy and Hœckel, the author stated that the only way to explain man's origin, consistently with his physical and mental connexion with the ape, is to suppose that nature is an organic whole, and that man is the necessary result of its evolution. While, therefore, man is derived from the ape, as supposed by Mr. Darwin, it is under conditions very different from those his hypothesis requires. According to this, the appearance of man on the earth must have been in a certain sense accidental; while, according to the author's view, organic nature could only have been evolved in the direction of man, who is the necessary result of such evolution, and a perfect epitome of nature itself.

A lengthened discussion followed.

#### Department of Zoology and Botany.

'On Two Specimens of *Echinorhinus spinosus*, taken in the Firth of Forth,' by Prof. DUNS.

'On the Structure of Crinoids,' by Prof. W. THOMSON.

'On a Proposal for a Modification of the Strict Law of Priority in Zoological Nomenclature in certain Cases,' by Mr. W. A. LEWIS.

'On the Species of *Grimmia* (including *Schistidium*), as represented in the Neighbourhood of Edinburgh,' by Mr. J. SADLER.

'On the Changes which occur in Plants during the Ripening of the Seeds,' by Mr. J. B. NEVINS.—The poppy capsule becomes erect, because the valves are at the summit of the capsule; whilst the campanulas droop their ripening seed-vessels abruptly, because the openings are at the base of the seed-vessel,—except in the case of the *C. persicifolia*, the openings in this particular campanula being at the summit, and not the base of the capsule. In the Primulaceæ, the drooping flowers generally change to erect seed-vessels, for the capsules open at the summit; but the cyclamen ripens its seeds in the ground; and therefore its stalk droops until the seed-vessel is buried in the earth, after which the capsule opens at its apex, and deposits its seeds. The anagallis has always a closed seed-vessel, from which there is no danger of loss, and the seed-vessels ripen in every possible direction. In the Scrophulariaceæ, the capsule opens at its summit, and the drooping flowers, e.g., foxglove, become erect in the ripening seed-vessel,—except in the simosella, which flowers in the winter, and droops its capsule, in order to bury the seeds in the mud in which it grows. The Composite, which flower in summer, have erect flowers, and remain erect whilst ripening their seeds; but those which flower under unfavourable circumstances, like the coltsfoot, in early spring, and the exotic African marigold, in autumn, undergo many changes in order to protect the seeds from the inclemency of the season.

'On the Minute Anatomy of the Stem of the Screw-Pine, *Pandanus utilis*,' by Mr. W. T. T. DYER.

'Observations on the Intimate Structure of



Spiral Ducts in Plants, and their Relationship to the Flower,' by Mr. N. STEWART.

'Zoological Results of the 1870 Dredging Expedition of the Yacht Norna, off the Coasts of Spain and Portugal,' by Mr. W. S. KENT.

TUESDAY.

*Department of Anatomy and Physiology.*

The SECRETARY read a paper, by Prof. FLOWERS, 'On the Composition of the Carpus in the Dog,' upon which a discussion took place, in which Prof. STRUTHERS, the PRESIDENT, and others, took part.

Prof. TURNER read a paper 'On the Cervical Vertebrae of the Stepiethyr.'—The author described the cervical vertebrae of the large female whale which was stranded at Longniddry in November, 1869, and of the soft parts of which he had given an account in the *Transactions* of the Royal Society of Edinburgh, 1870. Reference was also made to the cervical vertebrae of a large female stepiethyr, stranded at Northmaven, Shetland, in October of the same year. The author stated his belief that the stepiethyr is not an uncommon whale on the Scottish coasts. He had identified the great whale stranded at North Berwick in October, 1831, the skeleton of which is suspended in the Museum of Science and Art, with this species. Another specimen of the species was stranded at Aberdour in July, 1858.

'On the Cervical Vertebrae in Cetacea,' by Prof. STRUTHERS.—The paper was directed chiefly to the consideration of the various conditions of stiffness and mobility of the vertebrae, and the various degrees of development of the transverse processes. The seven vertebrae were present as a mammalian affinity, and their conditions are modified by function. The surgeon gives his patient a movable or a stiff joint according as he desires, by practising either rest or motion, and the same law would no doubt act in the whale's neck. The great ring of the transverse processes contains a large vascular plexus, as it contains an artery in man, but that is not its meaning. It is the walls of the ring which are developed for ligamentous and muscular attachments. The lower processes he divided into three stages, and compared these to three stages of the corresponding parts in man. The arches of the vertebrae, supposed to show a difference between the razor-back and sabbaldins, he showed to differ so much in his two specimens of razor-back, that little reliance could be placed on this character. The ligaments between the axis, atlas, and occiput had been dissected with difficulty, and he demonstrated their modifications in the whales. One of the razor-backs was the Peterhead whale, in which he had found the rudimentary bony hind limb, the sixteenth pair of ribs, and the rudimentary muscles of the fingers; the other was a larger one, from Caithness. The pike-whale, showing the deficient parts of the bony transverse processes to be represented by fibrous bands, had stranded at Aberdeen last year. The next specimens exhibited were from the Narwhal, male and female. Possibly in adaptation to the possession of the great tusk, the vertebrae were movable, while in the female, without the tusk, they were less movable. The male showed also an additional joint, on the same side as the tusk, between the atlas and axis. Passing next to the stiff-necked whales, Prof. Struthers exhibited a large series of specimens from the globiocephalus, obtained from the flock which stranded near Edinburgh some years ago. They showed progressive ankylosis of the vertebrae, and degeneration of the transverse processes. The younger ones showed even the rudiments of the epiphyses of the vertebral bodies, on vertebrae themselves rudimentary. The last neck exhibited was that of a right whale, the interest attaching to which was that, though probably a Greenland right whale, it presented more of the characters of the right whale of the South Sea. The conclusion he drew from the study of this neck was, that the supposed differences between the right whale of the North and South Seas were not so fixed characters as had been supposed.

'On the Bearing of Muscular Anomalies on the

Evolution Theory of the Descent of Man,' by Prof. MACALISTER.—Mr. Darwin, in his recent work, states, that as the varieties in the muscular system in man often simulate the normal arrangements in lower animals, this is a proof of genetic affinity. In this paper it was inquired: 1. If this be the case in all instances of muscular anomalies? 2. If not, in what proportion of the cases of anomaly is it true? Having examined the cases of anomaly on record, the author endeavours to determine these points; and briefly discusses the following series of varieties: 1. Muscles abnormal in man which are usually present in some lower animals; 2. Muscles abnormal in man, and not found in lower animals; 3. Muscles peculiar to man, and present as anomalies in the anthropoid primates. The paper concluded with an examination of the various hypotheses which have been proposed for the explanation of the occurrence of muscular anomalies.

Prof. RUTHERFORD exhibited a model of the circulation, constructed by him with a view to elucidate the phenomena of the pulse and the blood pressure. With the aid of the apparatus, he showed how the pulse is produced, why it is that with dilated capillaries there is a pulse in the veins, and why there is no pulse in the veins when the capillaries are contracted. He further showed why it is that the arterial is higher than the venous pressure, and the causes of variation in the amount of the arterial pressure.

Dr. A. GAMGEE read a paper 'On the Magnetic and Diamagnetic Properties of the Blood.'

'On the Existence of Hemoglobin in the Muscular Tissue, and its relation to Muscular Activity,' by Mr. E. RAY LANKESTER.—The author demonstrated to the Section, by means of the spectroscope, that hemoglobin existed in certain muscles of the gastropodous molluscs: viz., the active muscles which move the lingual ribbon and lips; at the same time the blood of these gastropods is entirely devoid of hemoglobin, being colourless. This was considered a proof of the functional relation of hemoglobin to muscular activity, and coincided with the results attained by Ludwig, who demonstrated the absolute necessity of the presence of oxygen in a muscle in order that it should be active; the hemoglobin, by its oxygen-seizing power, acts in the same way for the muscular respiration as it does in those exceptional invertebrates which, living in foul conditions, are, as Mr. Lankester showed, provided with hemoglobin in their blood, thus being enabled to accumulate what little oxygen there is present.

'On the Magnetic and Diamagnetic Properties of the Blood,' by Dr. A. GAMGEE.

'Contributions to the Anatomy of the Thoracic Viscera of the Elephant,' by Dr. M. WATSON.

'On a New Form of Tetanometer,' by Dr. M'KEN-DRICK.

*Department of Anthropology.*

'On the Anthropology of Auguste Comte,' by Mr. J. KAINES.

'On the Hereditary Transmission of Endowments and Qualities of different kinds,' by Mr. G. HARRIS.

'On the Physical and Philological Characteristics of the Wallons,' by Dr. CHARNOCK and Dr. C. BLAKE.

'On Skulls presenting Sagittal Synostosis,' by Prof. STRUTHERS.

'On Ancient Modes of Sepulture in the Orkneys,' by Mr. G. PETRIE.

'Note on a Cross traced upon a Hill at Cringletie, near Peebles,' by Mr. J. W. MURRAY.

'On certain Points concerning the Origin and Relations of the Basque Race,' by the Rev. W. WEBSTER.

'On the Origin of the Moral Sense,' by Dr. J. M'CANN.

'On the Order of Succession of the several Stone Implement Periods in England,' by Mr. J. W. FLOWER.

*Department of Zoology and Botany.*

Dr. P. L. SCLATER made some remarks on what he held to be an appropriate opportunity of establishing zoological observatories in connexion with

certain astronomical observatories which were to be established for the purpose of taking observations of the transit of Venus in 1874. On the occasion of the approaching transit, the Astronomer-Royal proposed to organize observing expeditions to the following five stations:—(1) Oahu, Sandwich Islands; (2) Kerguelen's Island; (3) Rodriguez; (4) Auckland, New Zealand; (5) Alexandria. At the first three of these stations it would be necessary to have a corps of scientific observers resident for twelve months previous to the transit, in order that the absolute longitude of these places, which was not now correctly known, might be obtained. Dr. Sclater pointed out how little was yet known of the terrestrial and marine zoology of these three islands, and specified various particulars in the case of each of their Faunas which it would be especially desirable to investigate. He urged the addition of one or more zoological collectors or observing naturalists to the corps of astronomical observers in each of these stations.

The Department unanimously concurred in the suggestion.

'On the Palaeontological Relations of the Fauna of the North Atlantic,' by Prof. WYVILLE THOMSON.

Prof. BALFOUR submitted some observations on the cultivation of *ipecauanha* in the Edinburgh Botanical Gardens for transmission to India. A short time ago Mr. James M'Nab, of the Botanical Gardens, had discovered that by cutting the root of the plant under the ground surface, numerous new shoots could be got, and the plant so propagated much more easily and plentifully. They had thus been able to send out a number of healthy plants to India, which it was hoped would be there equally successfully cultivated.

'On the Classification of the Vascular Cryptogamia as affected by recent Discoveries amongst the Fossil Plants of the Coal-Measures,' by Prof. W. C. WILLIAMSON.

'On some recent Additions to the Arctic Fauna (a New Antipathes, and a new Apodal Lophoid), by Dr. C. LUTKEN.

'On the Geographical Distribution of the Flora of North-West America,' by Dr. R. BROWN.

'Notes on Dredging at Madeira,' by the Rev. R. B. WATSON.

'On some Dredgings from Kenmare Bay,' by Mr. A. G. MORE.

'On the Brown Trout in Salt Water,' by Mr. A. G. MORE.

'Suggestions on Fruit Classification,' by Prof. A. DICKSON.

'On the Nature of the Peplum in the Cruciferous Fruits,' by Dr. J. B. NEVINS.—The peplum is really a simple prolongation of the stem, which produces the seeds direct, without the intervention of a capillary leaf, as is also the case in the Coniferae. The stem next produces two terminal leaves, which droop downwards, and are united by their apices to the stem below the point from which the seeds spring. The edges of these leaves are also adherent to the stem, and thus enclose the seeds. When the seeds begin to ripen, these two deflected leaves lose their attachment to the stem and begin to curl up until they are separated throughout, and eventually drop off at their articulation with the stem, like any other exogenous leaf, leaving the seeds attached to the stem in four rows. The silicle is, therefore, a strictly normal, though somewhat unusual, form of seed vessel; the peplum being the stem bearing the seeds, and the valves being two leaves, which spring from the stem above the origin of the seeds, like the crown of leaves in the pine-apple. In accordance with this view, the venation of the valves is directed downwards, i.e., towards the apex of the leaves, showing that they are deflected leaves.

'An Inquiry into the Function of Colour in Plants, or into its Relationship to the Manner of their Illumination during Different Stages of their Development,' by Mr. N. STEWART.

'On the Flora of Greenland,' by Dr. R. BROWN.

'On the *Carabus nitens* of the Scottish Moors,' by Dr. GRIERSON.

## WEDNESDAY.

## Departments of Anatomy and Physiology and Zoology and Botany.

These Departments met together (Prof. ALLEN THOMSON in the chair), to discuss the subject of Spontaneous Generation.

'On the Origin and Distribution of Bacteria in Liquids and Tissues,' by Dr. FERRIER and Dr. SANDERSON.

Dr. J. DOUGAL read a paper 'On the Relative Powers of Various Substances in Preventing the Generation of Animalcules, or the Development of their Germs, with special reference to the Germ Theory of Putrefaction.'

Dr. C. BASTIAN described some new experiments he had made in relation to the origin of life, and said that the result of these led him to the conclusion that living matter might arise *de novo*, and that this living matter might go on to the development of certain common organic forms, just as surely as any speck of crystalline matter in a fluid might take on and assume certain definite characters which belonged to that saline substance in its crystalline condition. His experiments showed that living organisms had been found in fluids exposed to a temperature higher than was sufficient to destroy germs.

A paper was given in, but not read, on account of the want of time, 'On the Origin and Sources of Fibrin in the Animal Economy,' by Dr. J. GOODMAN.

## Department of Anthropology.

Mr. J. W. FLOWER read a paper 'On the Succession of the several Stone Implement Periods in England.' It was illustrated by many specimens of flint implements, &c.—Mr. Flower said it had been customary to give flint implements to two eras—the Palæolithic and the Neolithic. The generalization had heretofore been convenient; but it was not now sufficient.

Mr. P. W. S. MENTEITH read a paper, written by the Rev. W. Webster, 'On Certain Points concerning the Origin and Relations of the Basque Race.'—It was in contravention of some ethnological theories propounded at a former meeting of the Association by Prof. Huxley.

Prof. STRUTHERS offered some remarks 'On Skulls presenting Sagittal Synostosis,' of which he exhibited specimens.—The paper was almost exclusively anatomical; but the controversy upon design or evolution was introduced into the discussion, which consequently was somewhat earnest in character.

Dr. J. M'CANN read a paper in opposition to Mr. Darwin's views on moral sense in the lower animals.

## SECTION E.—GEOGRAPHY.

## FRIDAY.

The proceedings commenced with a paper 'On the Geography of Moab,' by Mr. E. H. PALMER, who had carried on extensive explorations under the Palestine Exploration Fund. As an Arabic scholar of the first rank, and possessing peculiar qualities for the accomplishment of his task, Mr. Palmer was enabled to collect information of unusual interest and importance. Indeed, as Col. Yule remarked in introducing him to the Section, no one could be more competent than Mr. Palmer to make any communication on this subject, and in his extremely lucid and entertaining paper he fully justified the terms of praise in which the President had spoken of his attainments. He commenced by describing the country of Moab, which is about fifty miles long by twenty broad, and includes the table-land on the eastern shore of the Dead Sea, as well as that part of the Ghor which lies on the eastern bank of the Jordan opposite Jericho. The uplands he described as consisting of a rolling plateau, about 3,200 feet above the level of the sea, the western edge being cut up into deep valleys, and descending by a series of sloping hills, at angles of forty-five and fifty degrees, into the Dead Sea. These uplands are naturally divided into two districts by the great chasm of Wady Mojib, the Arnon of Scripture. Mr. Palmer gave

some very interesting instances of his identification of modern places and terms with those mentioned in Scripture history. For instance, he stated that the modern town of Kerek, though little better than a collection of hovels, stands upon the site of the ancient capital of Moab. In the Old Testament it is called Kir-Harseth,—Hareesh, or Heres. The first part of the name appears to signify "a walled city," but the meaning of the suffix has sufficiently puzzled commentators. But when Mr. Palmer was at Dhibán (the ancient Dibon), he unexpectedly met with an explanation of this term, and it is very curious as an example of the striking manner in which apparently trivial local idioms and customs often illustrate the phraseology of the Bible. Asking one of the Arabs where the Moabite stone was found, the latter replied that it was "between the harithen," that is, between the two hariths. Now, in Arabic this word would mean a ploughman, and on Mr. Palmer's demanding a further explanation, the Arab pointed out the two hillocks upon which the ruined village of Dhibán stands, and between them lay the fragments of the broken monument of Mesha. Nearly all the towns in Moab are built upon similar eminences, and Mr. Palmer found that they are invariably called Hariths by the Arabs. The word "Harith" is precisely equivalent in orthography to the *hareesh*, or *hareseth* of the Bible; and thus in an apparently insignificant idiom is seen an unexpected illustration of the topography of the Bible,—an additional reason for identifying the modern Kerek with the ancient Kir-hareseth—"the city on the hill"—and the interesting discovery of a local Moabite word handed down from the time of Jehoram, son of Ahab, to the present day. Mr. Palmer gave several other curious instances of this kind of identification, and described at some length the investigations of Capt. Warren, Mr. Tyrwhitt Drake, and himself.

Capt. H. S. PALMER contributed an interesting paper 'On an Acoustic Phenomenon at Jebel Nágús, in the Peninsula of Mount Sinai.'—Jebel Nágús is a peculiar sand-slope, from which loud and mysterious noises are frequently heard to proceed, exciting the superstitions of the Bedawin, and the wonder of all travellers in that dreary, silent waste. The slope is about 200 feet in height and almost triangular in shape, eighty yards wide at its base, and narrowing towards the top, where it runs off into three or four small gulleys. Sandstone cliffs bound it on either side, and above the head of the slope cliffs rise for about 150 or 200 feet more to the summit of the mountain. The sand, which is of a pale yellowish brown colour, appears to be that of the neighbouring desert, derived in the first place from the waste of the sandstone rocks, and then conveyed to its position on the hill-side by the drifting action of high winds. Its grains are large, and consist entirely of quartz. The neighbouring rock *in situ* is a soft, friable sandstone, of a light brown, sometimes nearly white colour, inside, and weathering to a dull brown on the outside. The sand of the slope is so pure and fine, and in its usual condition so perfectly dry, and lies at so high an angle (nearly 30°) with the horizon, as to be set in motion by the slightest cause. When any considerable quantity is thus in motion, rolling slowly down the slope like some viscous fluid, then is heard the singular acoustic phenomenon from which the mountain derives its name—at first a deep, swelling, vibratory moan, rising gradually to a dull roar, loud enough when at its height to be almost startling, and then as gradually dying away till the sand ceases to roll. Capt. Palmer said that this sound is difficult to describe exactly: it is not metallic, nor like the sound of a bell, nor yet that of a nágús. Perhaps the very hoarsest note of an Æolian harp, or the sound produced by rubbing the wet rim of a deep-toned finger-glass, most closely resembles it, save that there is less music in the sound of this rolling sand. It may also be likened to the noise produced by air rushing into the mouth of an empty metal flask or bottle; sometimes it almost approaches the roar of thunder, and sometimes it resembles the deeper notes of a violoncello or the hum of a humming-top. Capt. Palmer ascertained, in the

course of two days' experiments, that hot surface sand was always more productive of sound than the cooler layers underneath, the hot particles appearing to run more quickly than the cold.

In alluding to the papers by Mr. Palmer and Capt. Palmer, Col. YULE said, that had those been the only ones read, it would have been worth while opening the Section. But he intimated that the sounds which Capt. Palmer described are not the only ones of a similar character observed, Hugh Miller and others having noticed similar phenomena in various parts of the world.

Dr. GINSBURG followed Capt. Palmer with a verbal communication, relating to 'Farther Disclosures of the Moabite Stone.'—He referred, first, to the history of the stone, showed how it was discovered by the Rev. F. Klein, of the Church Missionary Society, in August, 1868, and explained how, in consequence of contentions among various parties striving for its possession, the stone was broken by the people from whom they sought to get it. Reference was also made to the impressions which had been obtained of the stone, recording three great events in the reign of Mesha, King of the Moabites. Among all the epigraphic monuments hitherto discovered, Dr. Ginsburg said that there are none of such importance to the history and language of the Old Testament, and to palæography generally, as this most ancient Semitic lapidary record.

With reference to Dr. Ginsburg's communication, Canon TRISTRAM intimated that what had been shown proved how much remains to be revealed. He also stated that Mr. Palmer had brought to light sixteen Simeonite towns, of which no notice has been given by our Scriptural topographers; and having paid a high compliment to Mr. Palmer, he indicated in what directions more discoveries should be sought for. Further exploration being thus shown to be desirable, a strong feeling was expressed by the Section in favour of a supplementary grant of 100*l.* for the purpose, and a hope was expressed that Mr. Palmer, Dr. Ginsburg, and Canon Tristram would be associated in carrying out the work.—The wishes of the Section were embodied in a recommendation by the Committee, and it is satisfactory to know that this recommendation was unanimously accepted by the Committee of the Association, with whom the decision rested.

A paper, by Mr. ST. CLAIR, 'On the Topography of Ancient Jerusalem,' advanced certain theories from which Canon TRISTRAM and Mr. BONNEY differed entirely, the former asserting that the views which Mr. St. Clair advanced were as absurd as if the Castle and the Calton Hill were transposed by some one describing the city of Edinburgh. Both these gentlemen contended that the discoveries which have been recently made confirm the description of Josephus, and also in a remarkable degree the Biblical accounts.

Two papers 'On Mekran' were also read; and the day's proceedings closed with a valuable paper, by Col. MACLAGAN, 'On the Geographical Distribution of Petroleum and similar Substances.'—This paper embraced notices of the different forms in which these products are found—bitumen, petroleum, naphtha and gas, &c., *munia*, amber, and ambergris; notices of the places in which these various substances are found, the extent to which they have been known, and uses to which they have been applied since early times; bitumen of the Euphrates valley, the Dead Sea, &c., and the remarkable fountains of naphtha at Bakú, on the Caspian; the applications of petroleum, naphtha, &c.; their use for light, for medical purposes, for igneous missiles in war; virtues of the substance called *munia*; the beliefs regarding the origin of this substance, of ambergris, and others of these products; concluding with a review of the geographical position in which they are found.

## SATURDAY.

The proceedings commenced with a paper by Staff-Commander GEORGE, R.N., describing 'A New Artificial Horizon,' which he had invented. As this instrument is absolutely essential to an



explorer's equipment, it is obvious that whatever tends to lessen size, weight, and inconvenience of carrying must be important; and Capt. George's invention provides all the advantages of the larger and more cumbersome horizon now in use, with the additional property of securing observations at very low altitudes. The improvements are not confined to its reduced size and weight, but extend to its mechanical arrangements, form, and moderate price. The horizon now in use weighs 6½ lb., while Capt. George's instrument weighs but 1½ lb.

Col. WALKER, R.E., bore testimony to its excellence, and recommended its use in the trans-Himalayan Survey.

This was followed by a description of Minicoy Island, by Major BASEVI, who was connected with the great Trigonometrical Survey of India, and who visited the island (which is situated west of Cape Comorin) with the object of comparing the intensity of gravity on an island station with that at inland stations in the same latitude. The result of Major Basevi's observations was the conclusion that gravity on the coast is greater than inland, and at an ocean station like Minicoy greater than on the coast. The island is of coral formation, covered with cocoa-palms, and contains more than 2,000 inhabitants, who are of the same race as the Maldives, and of the Mohammedan religion.

Capt. A. PULLAN, who has also been employed on the Trigonometrical Survey of India, contributed some notes 'On British Gurhwal,' which, he said, might be characterized as a net-work of mountain ranges separated by narrow ravines. The people consist of Rajpoots and Brahmans, and a third class of Helots, called Domes, who form the artisan portion of the Gurhwal population. Capt. Pullan gave an interesting description of native life in this state, as well as of the physical configuration of the country.

The next paper read was 'On the Inundation and Subsidence of the Yang-tze River, in China,' by Mr. S. MOSSMAN, who described the phenomena attending the annual floods of the Yang-tze-Kiang, which are similar to those of the Nile, but greater in inundation, and more devastating in effect. These floods depend upon rainfall from clouds caused by the south-west monsoon rising in the Indian Ocean, and the melting of snow in Eastern Tibet and Kokonoor, where the tablelands are from 12,000 to 13,000 feet above the level of the sea. So far the origin of the floods in the Yang-tze-Kiang is similar to that of the Nile, but the rise and subsidence of the former river are more rapid than those of the latter. The inundations vary more or less in their height from year to year, the range being from thirty-five to fifty feet, while the most frequent rise is about forty feet. Mr. Mossman adduced some curious facts in connexion with the phenomena attending these floods, abundantly proving that during his residence in China he used his powers of observation to good purpose.

A 'Report on Badakhshan,' by PUNDIT MANPHUL, an educated native of India, gave a graphic description of that district, and confirmed, to a most remarkable degree, the surveys which Capt. Wood, R.A. made in 1838-40. Capt. Wood's explorations were fitly rewarded by the Royal Geographical Society, which presented him with one of the gold medals, but beyond this honour he received no recognition whatever. Prussian and Russian geographers ignored his surveys; but the native travellers who have since penetrated to the same districts, have proved not only that Capt. Wood's discoveries were real, but that his positions were laid down with almost unerring accuracy.

A description by IBRAHIM KHAN of 'A Journey from Yassin to Yarkand' also gave some interesting information about the trans-Himalayan region.

Major-Gen. ABRAMOFF contributed a paper 'On the Principality of Karategin,' in which the country and its people were lucidly portrayed. The Principality appears to contain about 100,000 inhabitants, who differ in many respects from the people of adjoining states. They seldom practise polygamy; families do not live in common; and, while

every man may choose his own bride, the women exercise the privilege of rejecting suitors. Cattle-breeding is common; but the land is only cultivated with a view to internal consumption, the difficulty of the roads being so great that nothing is ever imported or exported. The dower at a wedding consists chiefly of ewes, goats, horned cattle of a large size, and horses. This dower is proportioned to the wealth and dignity of the bride's family, and ranges from a few ewes to hundreds, and to scores of horses.

'Encroachments of the Sea on the East Coast of Yorkshire,' by the Rev. T. O. MORRIS, dealt with a practical question, of immediate importance to many people in our own country. It seems from Mr. Morris's account that, on the average, there has been a loss of land from two to three yards every year; and statistics were adduced showing the amount and value of land which has been lost during a certain period. The aim of the paper was to prove the necessity for the erection of a sea-wall, of roughly-hewn, or even unhewn stones, laid on at an angle of about 35°, which, it was asserted, though not without being questioned, would for ever protect the land from encroachment.

#### MONDAY.

The papers set down for reading on this day were of a character to excite unusual interest. The first on the list was an account of 'The Second German Arctic Expedition,' by Dr. COPELAND, Astronomer to the Expedition.—The object and aim of this expedition were the scientific examination and discovery of the Arctic central region contained within the 75th parallel of north latitude, taking the coast of East Greenland as a basis. Two problems were involved in this aim—(1) the solution of the so-called Polar question; (2) the discovery, survey, and examination of East Greenland, and those countries, islands, and seas connected with it and extending in a northerly direction towards Behring's Straits, a measurement of a meridional arc in East Greenland, excursions on the glaciers of the interior of continental Greenland, &c. Two ships were engaged in the expedition, and sailed from Bremerhaven on the 15th of June, 1869, but after five weeks' sailing the vessels separated during a dense fog in lat. 75°. The Germania, Capt. Koldey, proceeded northwards until its progress was stopped in lat. 75° 31', or 23° further north than Clavering and Sabine reached forty-six years before. At this point the land-ice lay quite fast, and extended fully ten miles in a north-east direction from the nearest land, while against its outer edge the enormous fields of pack-ice were so heavily pressed as to render progress impossible. Capt. Koldey therefore determined to return to the Pendulum Islands, there to await in safety a change in the state of the ice. But the fact of the ship being frozen in did not discourage the members of the expedition, for not only were observations taken to ascertain the temperature and pressure of the atmosphere, the direction and velocity of the wind, the amount of cloud, and the height of the tide from hour to hour, but excursions were also made, and geological, botanical, and ethnological specimens were obtained. During the spring the labours of the expedition mainly took the direction of a sledge journey to the north, under the leadership of the captain, when an advance was made of 150 miles in a straight line from the winter quarters, and at least one whole degree was added to our maps of the coast of East Greenland. Various other tours were made, which were rewarded by several interesting discoveries, the most important being, perhaps, that of the musk-ox, which was found plentifully up to the 77th parallel. No recent traces, however, were found of the presence of the natives, but eleven skulls and many interesting weapons and utensils were discovered.

We have not space to give a detailed account of the work performed by the expedition, but ample and hearty testimony was borne to its merits by every one who took part in the discussion on Dr. Copeland's paper.—Dr. R. BROWN, who is

particularly well qualified to speak on the subject, spoke in the highest terms of the scientific results of the expedition, and of its additions to our knowledge of the distribution of plant and animal life in Greenland. The discovery of the musk-ox on the east coast of Greenland—hitherto not found south of Wolstenholme Sound, on the west coast—was remarkable; while that of the ermine and the lemming was equally interesting. The additions to our botanical and geological knowledge were also of deep importance. Physics had been attended to as well, and, taking it all in all, Dr. Brown declared that no expedition to the Arctic regions had ever surpassed this one in scientific importance—none during this century equalling it in the thoroughness with which all branches of science had been looked after by properly-trained special officers.—On the motion of Col. YULE, the members of the Section passed a resolution, expressing their admiration of the gallantry and resolution displayed by Capt. Koldey and his colleagues, and their sense of the great value of the scientific observations and geographical discoveries which had been made.

Dr. R. BROWN then dilated on a kindred subject, 'The Interior of Greenland.'—After reviewing the old ideas of the native of the interior, Dr. Brown spoke at length of the views to which his own studies and those of others had led him. Various more or less successful attempts had, he said, been made to penetrate into the interior; but the result of all these expeditions showed that the interior is one huge *mer de glace*, of which the outlets and overflow are the comparatively small glaciers on the coast, though, when compared with the glacier system of the Alps, they are of gigantic size. The outskirting land is to all intents and purposes merely a circlet of islands of greater or less extent. There are, in all probability, no mountains in the interior—only a high plateau, from which the unbroken ice is shed on either side to the east and west, the greatest slope being towards the west. No mountains have been seen in the interior, the prospect being generally bounded by a dim, icy horizon. Dr. Brown considered that Greenland might be crossed from side to side with dog or other sledges, provided the party started under experienced guidance and sufficiently early in the year.

A paper was read, 'On the American Arctic Expedition.'—In this paper, Capt. WARD, R.N., gave an account of the arrangements made for this expedition, the object of which is to reach the North Pole, and collaterally to solve the question as to the existence of a Polar basin.

After Dr. RAE had adduced proof, in the shape of facts and figures, of the eligibility of the Saskatchewan Valley as a field for emigration, and of the desirability of making it the route for the proposed railway from Canada to the Pacific coast, Mr. CLEMENTS MARKHAM contributed a very able and valuable paper 'On the Eastern Andes, and the Navigation of the Madeira River.'—No one is better qualified than Mr. Markham to express his views on this subject, and in his paper he showed the immense importance which attaches to the opening up of the navigation of the Amazons and its tributaries. The produce of the eastern slopes of the Andes have now to be transported across the mountains for shipment—"a ruinous land-carriage to the Pacific coast." Mr. Markham said that "the cost of taking a ton of merchandise from Cuzco, the capital of the Yncas, or from La Paz, the commercial capital of Bolivia, to England, is about 40*l.*, the time five months. Under such conditions, no produce but gold, silver, and chinchona bark would pay the expense of transit. By the route of the Madeira and Amazons, "this voyage of five months will be reduced to six weeks." Mr. Markham also pointed out that the enlightened policy of the Brazilian Government not only helps, but takes the lead, in opening the way from the Andes to the Atlantic, and from the Atlantic to the Andes, for the commerce of the world. The physical difficulties which obstruct the navigation of the Madeira were explained, the magnificent scenery and the wondrous richness

of the soil were described, and statistics were quoted, showing how rapidly Amazonian trade has increased during recent years. Mr. Markham is of opinion—and in this we believe he is supported by Mr. Bates, who is certainly one of our greatest authorities on the Amazons—that this is the country of the future. But as a matter for immediate consideration, he asserts, that "in no other part of the world is there a grander field for geographical discovery and research," and in "no other part of the world will the labours of the explorer be more richly repaid."

The Exploration of the Head Waters of the Marañon, by DON ARTURO WERTHERMAN, an engineer of considerable scientific attainments in the Peruvian Government, explained what steps have been taken and what proposals are made for the purpose of making a road between the important town of Chacaboyas, in the north-western part of Peru, and a navigable point on the river Marañon, the main source of the Amazons. The region which Mr. Wertherman explored has never before been scientifically examined, and by laying it open to our view this distinguished engineer has performed an important service to geographical science.

## TUESDAY.

This was the last day on which the Section met, and the proceedings commenced with the reading of a paper, by Mr. A. BUCHAN, 'On the Rainfall of the Northern Hemisphere in July contrasted with that for January.'—It was shown that the greatest amount of rainfall occurs in the centre of the continent of Asia and Europe, taking them both as one continent; and that the line of greatest rainfall passes through the centre of Europe and towards the centre of Asia to some distance north of the Caspian. Mr. Buchan also showed that the greatest excess of the rainfall in July is in those regions to which the prevailing winds arrive after having traversed a vast extent of ocean—India and Central America. Illustrating this connexion, on the western slopes of the British Isles the rainfall of July is less than that of January, but on the eastern slopes it is greater. In July, when the prevailing winds blow from the Atlantic eastwards into the centre of the great continent, the rainfall of the hills of this immense tract is greatly in excess of what it is in January. Mr. Buchan further pointed out the importance of inquiry in reference to the great movement of the atmosphere, especially the vapour which is condensed into rain, and which must come from some neighbouring surface.

Mr. CLEMENTS MARKHAM followed Mr. Buchan with a paper 'On the Geographical Position of the Tribes which formed the Empire of the Yncas.'—The views expressed in this paper were formed upon a study of early writers, native languages, and the topography of the country. The study of the nature and degree of the civilization attained by the aboriginal Americans is especially important because, as Mr. Markham said, that civilization was self-developed. The three American empires of the Yncas, the Chibchas, and the Aztecs, were based upon the progress made in the arts of civilization by the tribes which composed them, and on the united efforts of those tribes, after they had been welded into great nations. The region inhabited by the nations which formed the empire of the Yncas is a long strip of mountain and coast line, bounded on the east by the forest-covered plains of the Amazonian basin, on the west by the Pacific Ocean, and extending north and south from 2° N. to about 20° S., or upwards of 1,500 miles, with an average width between the seashore and the Amazonian forests of 400 miles. Mr. Markham gave a very vivid description of this region, showing what influences had affected the nations, and pointed out some of the most striking features in their economy.

An interesting and well-written paper, 'On the Ruined Cities of Central America,' by Capt. BRINE, R.N., was followed by some 'Notes of an Ascent of the Volcan de Agua, in Guatemala, Central America,' by Mr. W. B. RICHARDSON.

The PRESIDENT then gave a very interesting account of 'Capt. Garnier's Expedition up the Cambodia.'—This was a subject with which Col. Yule was peculiarly qualified to deal. After recapitulating certain reasons why the French should direct their attention to the Cambodia, and giving a short historical sketch of what had been previously done by Europeans on the Higher Waters, he proceeded to describe what was accomplished by the French expedition, which started from Saigon on the 5th of June, 1866. The difficulties which impeded the progress of the expedition, the various countries through which it passed, the people inhabiting them, and all matters of general interest attaching to the labours of the explorers, were laid before the Section with consummate ability by Col. Yule, who estimated the whole distance traversed and the extent of actual itinerary surveyed at over 4,000 miles. For the great work which he accomplished Capt. Garnier was awarded the gold medal of our Royal Geographical Society; and it is to be hoped that we shall soon have a detailed account of this labour from his own pen. Col. Yule believes that the facts about this expedition are little known in England, or even in France.

Major SLADEN then read a paper 'On Trade Routes between Burmah and China,' and explained that the object in view in all explorations undertaken in Burmah had been a desire on the part of our Government and mercantile classes to ascertain the practicability of establishing an overland route from the Bay of Bengal to Central and South-Western China. Major Sladen referred to the expedition which he conducted up the Irawadi two or three years ago, and pointed out the practicability of navigating this river nearly, if not quite, up to the Chinese frontier. At Bhamo, 900 miles from the sea, and probably 1,000 miles from its source, the Irawadi, when full between its natural banks, is four miles in breadth, and during a third of the year or more it might be navigated with the greatest ease as far as Bhamo, by vessels as large as any that have ever ascended the Yangtze, from Shanghai to Hankow. By selecting the Irawadi as a means of transit for produce from South-Western China, and Rangoon as a port of export for such produce, the voyage to Europe, both in distance and duration, would be reduced in a corresponding degree, the expenses of navigation would be reduced, the risks and dangers attending difficult navigation through the streets of Malacca and the China Seas avoided, and the heavy insurances at present in force by reason of such difficult navigation would be altogether done away with.

The last paper read before the Section consisted of some letters which the Archimandrite Palladius had written from Vladivostok and Nikolsk, South Ussuri district, and which had been translated from the Russian, for the purposes of the meeting, by Mr. DELMAR MORGAN.

In closing the Section, Col. YULE briefly reviewed the work which had been done, and which, if it does not render the meeting memorable, cannot but be regarded as useful and important.

## SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

## SATURDAY.

Mr. W. TAYLER read a paper 'On the Manual Labour Classes of England, Wales, and Scotland.'

Dr. G. SMITH read a paper 'On Indian Statistics and Official Reports.'—The writer endeavoured to give some idea of the sources of statistical information in India, in the hope that statisticians might be induced to direct their attention to some of the great Indian questions as illustrated by statistics.

A paper, by Mr. R. B. WALKER, 'On the Organization of Societies, Nationally and Locally Considered,' was held as read, and the Section adjourned.

## MONDAY.

Mr. W. A. PETERKIN, General Superintendent of Poor, contributed a paper 'On the Administration of the Poor Law.'—It was the wish of the entire community that no one should die of actual starvation, and therefore all plans for the distribu-

tion of funds raised for the relief of the poor were based on the minimum necessary to maintain life. This was the absolute requirement. The Poor Law of Scotland required "needful sustentation." The interpretation of that term was left to the judgment of local administrations, and there were 885 separate bodies, each acting on its own responsibility. Their decisions were subject, on complaint, to the review of a central authority, instituted by Parliament. Uniformity, under such circumstances, was hopeless, and if practicable, would not be desirable. There was no point to which attention required more to be given than to the necessity of each case combining in itself *destitution* and *disability*. The question of disability was practically more easily determined than that of destitution, and on that point there was the greatest diversity of opinion among all classes. The chief advantage to be gained from the expedient of a poor-house was, that it enabled a local board to administer the rates more satisfactorily to themselves and to the public, by checking in a rough kind of way attempts to impose, and more economically in cases where lodging, nursing, and clothing were required. After giving some statistics and results relating to the cost of pauperism and to illegitimacy, he referred to the education of pauper children, and said whether local boards could do more for the education of such children than they did, by making attendance at school a condition of relief to the parent, was deserving of consideration; but the supineness of pauper parents as to the education of their children was well known, and it must be borne in mind that the elder children were frequently material aids in the family struggle for existence. Having made reference to the improved condition of the paupers compared with that of fifty years ago, and to the provision for medical aid, costing each parish on an average 40*l.* per annum, he gave some information as to Shetland. In Scotland out-door relief was the rule; for twelve who received relief at their own homes, only one would be relieved at the poor-house. He concluded by stating that it was an advantage of the Scotch system of Poor Law administration that every recipient of relief was personally known to and visited by local responsible officers, controlled by 885 separate boards, representing all interests; and that it was of the utmost importance to all that these local boards should be constituted so as to secure an impartial, intelligent, and humane administration.

Mr. LAMPART thought Mr. Peterkin had left out a very important matter in connexion with the satisfactory administration of that law, not only in Scotland but in England, viz., to the spirit in which the Poor Law was administered. He believed that where Poor Law guardians looked upon the pauper classes, which embraced in many cases the unfortunate of the poorer class, as their natural enemies,—where they looked upon themselves as guardians, not of the interests of the poorest of the working classes, but of the parish purse,—the evils of pauperism were aggravated to a great extent.—Mr. SHILLINGFORTH wished that Mr. Peterkin had touched on the effect that the Poor Laws had upon wages.—Mr. MACKNIGHT said that in Scotland before 1845, their Poor Law system was practically voluntary; now, it had been made compulsory. He was of opinion that, if this subject was looked at from a large point of view, it would be found that so far from the poor in Scotland having been benefited by the Act of 1845, they were now worse off than they previously were.

Mr. G. SERON read the following papers:—1. 'On Certain Cases of Questioned Legitimacy under the Operation of the Scottish Registration Act.' This paper had reference to the subject of adulterine bastardy. It touched upon the conflict between the legal presumption in favour of a child born in wedlock being the lawful issue of the spouses, and the mother's conviction of its illegitimacy; and showed the course followed in the registration of such cases.—2. 'The Illegitimacy of Banffshire.' This paper gave elaborate details regarding the illegitimacy of births during the four years ending 1861, and embraced a supplementary



appendix relative to the four years ending 1869. It showed, *inter alia*, that, with a few rare exceptions, the county of Banff has always exhibited the largest percentage of illegitimacy—viz., about 16 per cent.—the ratio for Scotland being between 9 and 10 per cent. Very considerable difference exists in the different parishes, the maximum rate being upwards of 25 per cent., and the minimum as low as 6 or 7 per cent. As a rule, the seaboard parishes gave a lower per-centage of illegitimacy than inland ones.—3. 'The Expediency of Recording Still-Births.' This paper mentioned that, while these births were recorded in France and some other continental countries, they were not registered either in England or Scotland, and showed that the statistics of the subject are very imperfect. The still-births in Glasgow, during the three years subsequent to 1849, were estimated by the late Dr. Strang to have amounted to 1 in 12, or upwards of 8 per cent. In France their per-centage amounts to between 4 and 4½ per cent., and in Paris to about 7½ per cent. The ordinary proportion among legitimate children is from 1 to 18 to 1 in 20 of all births, and among illegitimate children three times greater.

Dr. W. STEPHENSON read a paper 'On the Scientific Aspects of Children's Hospitals.'

Sheriff CLEGHORN read a paper descriptive of the operation and results of the Wellington Reformatory, near Penicuik.

## TUESDAY.

Miss LYDIA BECKER read a paper 'On some Maxims of Political Economy as applied to the Employment of Women and the Education of Girls.'—When we regard the various employments common to both sexes by which persons gain a livelihood, we find one rule of almost universal application—namely, that when men and women are engaged in the same occupation, the remuneration of the women is fixed at a lower rate than that of the men. In some cases this discrepancy arises from the fact that a man does more work in a given time than a woman, or, on account of his physical capabilities, he is able to perform more efficiently the portion of work which he undertakes. In such cases the excess of remuneration is the natural reward of superiority in quality or quantity of work. In other cases, the superiority in the remuneration of men's labour arises from the circumstances that it is educated and skilled labour, while that of women is uneducated or mechanical labour. Here the superiority in remuneration arises from superiority in the quality of the work, but the capacity to perform the superior work is naturally correlated, not to the sex, but to the education of the labourer; and with equal training and advantages women would do as good work and deserve as high wages as men. In other occupations, the work to be done is absolutely the same—the requirements demanded absolutely equal—yet the remuneration to be given to the woman-labourer is arbitrarily fixed at something like two-thirds only of that which is given to a man. This remark has special reference to teachers, schoolmasters, and schoolmistresses in public elementary and endowed schools. Women are said to be paid less because of the action of the law of supply and demand; but there would not be such a superabundant supply of schoolmistresses compared to schoolmasters, if women were not arbitrarily shut out from many remunerative intellectual employments in which they are fully competent to engage. Women are excluded from employments they are eminently fitted for, such as the painting in the Staffordshire Potteries. We have had a conspicuous instance in this city of the power of trades-unionism in preventing the entrance of women into one of the learned professions; and we find the rule that less must be given to a woman than to a man prevailing under circumstances where it cannot be excused under the plea of the maxims of economic science. In the table of conditions under which the Government will grant deferred annuities, we find that if a man and a woman of like age pay an equal premium for an annuity beginning at sixty years of age, the woman's annuity will be 33 per

cent. less than that of a man. If it be alleged that this is because her expectation of life is greater, we turn to the tables for insuring their lives, and find that a woman has to pay exactly the same premium as a man of like age for an assurance on her life. As these tables are calculated on the probable expectation of life for persons of every age, we have a right to assume that, whatever may be the difference in value between a male and female life, it is so inconsiderable as not to be worth allowing for in calculating the premium on a life insurance policy. We are, therefore, driven to the conclusion that the difference in the value of an annuity is owing to the notion that it is wrong to give a woman as much money as a man, even if she has paid the same consideration for it. There is another matter connected with the public educational provision for girls in which, as it seems to me, there is a violation of the principles of economic science, and of equality in regard to the two sexes—I mean the introduction of needlework as a compulsory subject for girls in public elementary and endowed schools. Without disparaging the importance of needlework in the present condition of domestic economy, I maintain that it is a branch of industry, and not of learning; and that, while it may properly form part of the course of an industrial or technical school, it is out of place in an ordinary elementary school. If sewing were removed from the list of subjects taught in elementary schools, its place might be supplied by a subject which, while coming properly within the range of general education, would perhaps be even of more immediate importance to the well-being of families than even needlework—I mean physiology and the laws of health. So long as dense ignorance prevails among the mothers of the race, we must expect a stunted and ill-developed generation to grow up. I grudge nothing that is being done to promote the intellectual development of the other sex; but I ask for my own an equal share in these advantages, in order to attain that end after which we are all striving—namely, that the whole people should become thoroughly educated.

Lord HOUGHTON thought that Miss Becker was incorrect in asserting that the painting in the Staffordshire Potteries was done entirely by men. He believed that a considerable portion of it was done by women; but he could gratify her by the information that there was so much fear of the competition of women among the workmen that, while the men did their work with a rest for the arm, they only allowed the women to do it without a rest. This, however, was connected with the whole system of competition in England; and Miss Becker was too sensible and hard-headed not to see that the men engaged in it would not allow sentiment to enter into the matter; and when we found the antagonism of competition resulting even in the most extravagant outrages and infractions of the law by trades-unions, there was no wonder that some of that limited and uncharitable spirit should extend to the competition of women as well as men.—Mr. J. G. FITCH gathered from Miss Becker's statements that she attributed the smaller pay of the female teachers to the deliberate arrangements of the Privy Council. Now, it was worth while noticing that the Privy Council did nothing whatever in the way of regulating salaries. It was done by the local committees, who made their bargains with the teachers, and whose bargains were regulated by the ordinary law of supply and demand, and by the simple fact that the salaries of well-instructed women in any given position were considerably less than those of the men in the same position. Miss Becker had alluded to the very large portion of time spent in needlework in the elementary schools, which she also attributed to the action of the Privy Council, and the instructions given to the inspectors. No doubt the Privy Council insisted upon needlework as part of the course of instruction in all girls' schools, but the truth was, it was to the ladies' committees that we must attribute the fact that little girls sat dawdling over needlework during the whole forenoon of every day they attended the school.

Mr. C. LAMPORT read a paper 'On Naval Efficiency and Dockyard Economy.'

Mr. S. BROWN read a paper 'On the Measurement of Man and his Faculties.'

Mr. W. BOTLEY read a paper 'On Land Tenure.'

A paper, by Mr. J. MEIKLE, 'On the Mode of Assessing for the Poor,' was read; and the Section adjourned.

## SECTION G.—MECHANICAL SCIENCE.

## MONDAY.

The 'Report of the Rainfall Committee' was brought before the Section by Mr. G. J. SYMONS.—It appears that there are about two thousand observers spread over the whole extent of the British Isles, working in connexion with this Committee. The Report discussed at considerable length the observations received, and was accompanied by a number of very elaborate tables and maps illustrative of the subject. There are still, however, large tracts in Ireland, and even in Scotland, where observations are wanting; and the Committee would be glad to receive offers of assistance from those who have residences or property in those parts, and state that the Secretary will readily advise them as to instruments.

Mr. C. W. SIEMENS described 'A New Form of the Steam Blast.'

Mr. T. STEVENSON read a paper 'On a Thermometer of Translation.'

Mr. T. CARR described 'A new Mill for Disintegrating Wheat.'—The machine, which is termed a disintegrator, consists essentially of two discs, each fixed upon a horizontal shaft. These shafts are placed in one line, the discs which they carry at the ends are separated the one from the other by a space of a few inches. Each disc carries a number of bars or studs, disposed in several concentric rings, and standing out at right angles from its face. The concentric rings of studs of the one disc are arranged so as to be in the spaces between the concentric rings of the other disc. The discs are driven in opposite directions, and at high velocity. The rings of studs, although very numerous, do not reach to the centre of the machine; this part is unoccupied by studs, and acts on an "eye" to receive the feed. The first two or three rings of studs beginning at the centre are fixed to one of the discs only, viz., the one opposite to that through which the feed enters, and they serve to distribute that feed equally throughout the machine. So soon, however, as the material has passed by centrifugal force beyond the limit of the outermost of these central or "eye" rings, it is met by the first of the rings moving in the opposite direction. The studs of this ring find the material while in mid air, and moving in a direction opposite to their own motion, and with a velocity due to the circumferential speed of the ring of studs which the material has just quitted. The result of this meeting is clearly, first a violent blow, and then a reversed motion, by which the whole of the material is sent flying through the air in a direction contrary to that which it last had, and with a velocity increased by the increased circumference of the ring of studs which has just put it in motion; a velocity and a direction, however, to be all but instantly arrested and reversed by the action of the next ring of studs; and so the material proceeds from ring to ring until it is delivered completely pulverized at the circumference of the machine. The action will thus be seen to be absolutely different from that of millstones, edge-runners, and crushing-rollers. The proportions of the machines and the size of the studs vary according to the material to be operated upon. For flour manufacture, it is about 7 feet diameter, and has a space of about 10 inches between the faces of each disc. The studs are circular, half-an-inch in diameter, and are made of crucible steel. The distance from centre to centre of the studs is 2½ inches, and from centre to centre of the rings 2½ inches; so that there is a clear space, both circumferentially and radially, of 2 inches between the studs. The revolving discs are enclosed in a casing, at the bottom of which is the

usual worm or screw for carrying away the products. The machine is driven by a counter-shaft, and the ordinary working speed is 400 revolutions per minute. A machine on this principle is now at work at Messrs. Gibson & Walker's, of Bonnington Mills, Leith; and the flour produced is stated to be of a much superior quality to that obtained by ordinary grinding, while the cost of its production is considerably less. The following is given as the percentage of produce of two different lots of wheat passed through it:—Old Scotch wheat produced—Flour, 45 per cent.; semolina, 26 do.; bran-flour, 4½ do.; exhaust flour, 1½ do.; seconds, 4 do.; parings, 1½ do.; bran, 13 do.; black dust, &c., 2½ do.; loss, 1½ do.—100. The other was a mixture of Baltic and Ghirka wheats, and produced—Fine flour, 35 per cent.; semolina, 36 do.; bran-flour, 4½ do.; exhaust flour, 1½ do.; seconds, 3½ do.; parings, 2 do.; bran, 13 do.; black dust, &c., 3 do.; loss, 1½ do.—100. These statements show the varied effects produced by this novel process on different descriptions of wheat. The quantity of semolina obtained from hard wheats, it will be observed, is much greater, and that of flour much less, than from soft wheats. But what is of most importance is the ultimate result. The quantity of finest flour obtained varies, of course, according to the quality of the wheat used. In regard to the cost of working, the paper pointed out the very much smaller prime cost of the disintegrating flour-mill compared with that of the twenty-five pairs of millstones it supersedes; also the very slight and rarely needed repairs it requires, against the keeping in order of so many pairs of millstones; the fewer men required, and consequent saving in wages; the small ground and space occupied, and the much less driving power needed in the one case than in the other.

Mr. BRAMWELL said he had on Saturday, along with the President of the Section and others, inspected the mill, and he thought there could be little doubt it was a very ingenious machine. He had thoroughly inspected the principle of action in a variety of ways, with great satisfaction to himself. The result of the inspection was as follows:—The machine, in grinding twenty quarters an hour, took 145 gross indicated horse-power; when grinding fifteen quarters, it took 123 horse-power; when running empty, grinding the air, it took 63 horse-power; but when both discs were lashed together, so as to run in one and the same direction, it only took 19 horse-power, because the air was not being ground. When running empty at half-speed, it took one-seventh of the power it took when running empty at full speed; but if the calculation could have been closely made, no doubt it would only have taken one-eighth of the power. In regard to the production of the mill, he was not a practical miller, but he thought it was producing an extremely good quality of flour.—Mr. SIEMENS said he thoroughly approved of the principle of the machine, but he did not gather, from what had been said on the subject, whether a comparison had been made between the power required for a certain amount of work by this machine and a similar amount of work by the old millstone principle.—Mr. EASTON stated that to grind twenty quarters of wheat per hour by the old millstone system would require twenty-six pair of 4ft. 6in. stones and a power of from 200 to 250 horses.

'On Improved Ships of War,' by Mr. M. SCOTT.  
'On an Apparatus for Working Torpedoes,' by Mr. P. BRAHAM.

## TUESDAY.

Mr. R. B. GRANTHAM read the 'Report of the Committee on the Treatment and Utilization of Sewage.'

Mr. E. C. C. STANFORD read a paper 'On the Carbon Closet System,' advocating the treatment of the fecal sewage by charcoal, and describing an automatic mechanical arrangement for the purpose.

Mr. Alderman RUMNEY advocated the dry system, whether by means of charcoal or otherwise, and stated it to be satisfactory at work in Manchester, Rochdale, and other places in Lancashire.

—Mr. GILBERT took the side of the irrigation treatment, pointing out that the dry system only dealt with a portion of the sewage, and that the dry system thus left a large amount of house refuse to be dealt with in the sewers.

Mr. L. E. FLETCHER read 'An Interim Report of the Committee on Steam-Boiler Legislation,' in which the Committee stated that, the Parliamentary Report having been so recently published, there had not been time for its due consideration, or for the Committee to meet and confer thereon, and they had postponed entering into the subject on the present occasion.

Mr. L. E. FLETCHER then read a paper on the same subject, in which he suggested a national system of inspection, enforced, but not administered, by Government, the administration being committed to the steam users themselves, with a due infusion of *ex officio* representatives of the public.

Mr. BRAMWELL objected to an enforced inspection, and was of opinion that there should be no fixed minimum penalty on boiler owners as compensation for life in cases of accident; that practical engineers should be called in at coroners' inquests; and that boiler-makers should undergo examination in the principles of engineering, and should be licensed.—Mr. BATEMAN was in favour of inspection.

## WEDNESDAY.

Mr. A. BUCHAN gave an interesting and valuable paper 'On the Rainfall of Scotland,' which was followed by a discussion, in which Mr. BATEMAN and Mr. SYMONDS took part.

Mr. BRAMWELL put in a Report of his inspection of the working of Carr's disintegrator, which has been recommended for insertion at length in the volume of the *Transactions* of the Association.

The concluding meeting of the General Committee was held in the University, at one o'clock, on Wednesday, the 9th inst., Sir WILLIAM THOMSON in the chair.—Dr. HIRST read certain regulations which were proposed by the Committee on Recommendations to be adopted, relating to the proceedings of the Sections.—These Resolutions were adopted.

Dr. HIRST said the next subject referred to the General Committee on Recommendations had reference to Dr. King's proposal, that there should be a Sub-Section of Anthropology. The Committee therefore recommended—"That, in future, the division of the Section of Biology into the three departments of Anatomy and Physiology, Anthropology, and Zoology and Botany, should be recognized in the programme of the Association meetings; and that the president, two vice-presidents, and at least three secretaries shall be appointed; and that the vice-presidents and secretaries, who shall take charge of the organization of the several departments, should be designated respectively before the publication of each programme."—The recommendation was agreed to.

Dr. THOMPSON read the Report on the resolutions involving applications for grants of money, which were as follows:—

## Kew Observatory.

The Council—Maintaining the Establishment of Kew Observatory .. .. . £300

## Mathematics and Physics.

Cayley, Prof.—Mathematical Tables .. .. 50  
Crossley, Mr.—Discussion of Observations of Lunar Objects .. .. 20  
Tait, Prof.—Thermal Conductivity of Metals .. .. 25  
Thomson, Prof. Sir W.—Tidal Observations .. .. 200  
Brooke, Mr.—British Rainfall .. .. 100  
Thomson, Sir W.—Underground Temperature .. .. 100  
Glaisher, Mr.—Luminous Meteors .. .. 20  
Huggins, Dr.—Tables of Inverse Wave Lengths .. .. 20

## Chemistry.

Williamson, Prof. A. W.—Reports of the Progress of Chemistry .. .. 100  
Williamson, Prof. A. W.—Testing Siemens's New Pyrometer .. .. 30  
Gladstone, Dr.—Chemical Constitution and Optical Properties of Essential Oils .. .. 40  
Brown, Dr. Crum—Thermal Equivalent of the Oxides of Chlorine .. .. 15

## Geology.

Duncan, Dr.—Fossil Crustacea .. .. 25  
Lyell, Sir C., Bart.—Kent's Cavern Exploration .. .. 100  
Harkness, Prof.—Investigation of Fossil Corals .. .. 25

Busk, Mr.—Fossil Elephants of Malta (renewed)	25
Harkness, Prof.—Collection of Fossils in the North-West of Scotland .. ..	10
Ramsay, Prof.—Mapping Positions of Erratic Blocks and Boulders .. ..	10
<i>Biology.</i>	
Stalton, Mr.—Record of the Progress of Zoology ..	100
Balfour, Prof.—Effect of the Denudation of Timber on the Rainfall in North Britain (renewed) ..	20
Sharpey, Dr.—Physiological Action of Organic Compounds .. ..	25
Foster, Prof. M.—Terato-Embryological Inquiries ..	20
Foster, Prof. M.—Heat generated in the Arterialization of the Blood (part renewed) ..	15
Christison, Prof.—Antagonism of Poisonous Substances ..	20
<i>Geography.</i>	
Murchison, Sir R., Bart.—Exploration of the Country of Moab .. ..	100
<i>Economic Science and Statistics.</i>	
Bowring, Sir J.—Metric Committee .. ..	75
<i>Mechanics.</i>	
Rankine, Prof.—Experiments on Fletcher's Rhysimeter ..	30

£1,620

With reference to the last vote, Mr. NAPIER moved, that for the words "Fletcher's Rhysimeter," there should be substituted, "Experiments to measure the speed of ships and currents by means of the difference in heights of two columns of liquid."—This motion having been agreed to, the whole of the proposed grants of money were approved of.

The meeting then adjourned, the next meeting to be held at Brighton; Dr. CARPENTER is the President elect for next year.

The concluding meeting of the Association was held in the Music Hall, at half-past two o'clock, Sir WILLIAM THOMSON in the chair.—Mr. GRIFFITHS stated that the number of tickets issued for this meeting had been as follows:—Old life members, 246; new life members, 28; old annual members, 311; new annual members, 127; associates, 976; ladies (transferable tickets), 754; foreign members, 21—total, 2,463. The money received for these tickets was 2,575*l*.

## Science Gossip.

THE Annual General Meeting of the Miners' Association was held at Falmouth on Monday last. The Report of the Council was very satisfactory as to the extension of the classes for imparting some scientific knowledge to the practical miner.

The first volume of the 'Report of the Commissioners appointed to Inquire into the Several Matters relating to Coal in the United Kingdom' has been published. This volume contains the General Report and twenty-two Sub-Reports. Vol. II. will contain a vast mass of evidence, and Vol. III. will be devoted to the Report of the Committee E., consisting of Sir R. I. Murchison and Mr. Robert Hunt, who had charge of the statistical portion of the inquiry.

THE Exhibition of the Royal Cornwall Polytechnic Society opened on Friday, the 11th inst., under the Presidency of Charles Fox, Esq., who forcibly pointed out that the primary object of the Institution was to promote and encourage any industry for the investigation of scientific pursuits, and to create and encourage a growing taste and appreciation of the fine arts. Numerous models of machinery applicable to the purposes of mining, and drawings illustrative of the geological and mineralogical conditions of the West of England, were exhibited, and many of them received the medals and prizes of the Society.

THE influence of a solar eclipse upon terrestrial phenomena has been shown by the observations of Diamilla Müller, made in December last, and published in the *Gazzetta Ufficiale del Regno d'Italia*. At the commencement of the eclipse the magnetic needle began to recede; it obtained its maximum declination at the time of totality, and then resumed its natural movement, until it resumed the exact position which it occupied before the commencement of the eclipse. Some observations made near Barnstable, by Mr. Townshend Hall, and communicated to the *Meteorological Magazine*, show analogous results on the thermometer.

THE August flight of meteors has punctually kept its time this year. M. Chapelas, in the *Comptes Rendus*, in a memoir on Shooting Stars,



attempts to prove that there are two meteoric currents, one having a constant direction in the higher regions, while the other, which is much nearer the earth's surface, varies its direction with the time of the year. Further observations are required before this can be accepted as a fact.

A POLYTECHNIC exhibition upon an extensive scale is announced to take place in Moscow in the spring of next year (1872). The applications of science to mechanics and manufactures will claim, it is said, a large share of attention.

THE Société des Arts et Sciences established at Utrecht has issued a series of questions on subjects embraced under the heads of Natural Sciences and Medicine, Belles-Lettres, Philosophy and History, Jurisprudence and Political Science. The replies are to be sent before November 30th, 1872, to the Secretary of the Society, M. N. F. Van Nooter, Councillor of the Provincial Court of Utrecht. Gold and silver medals are offered for those replies which are considered by the judges to be the most satisfactory.

THE *Journal of the Society of Arts* states the important fact—we presume upon sufficient authority—that indigo will dissolve in Venice turpentine heated to its boiling-point, or in boiling paraffin, with the same blue colour as the solution in sulphuric acid; and that in petroleum it forms a carmine solution, while in spermaceti it produces a carmine-violet, and in stearic acid a blue colour.

C. W. BLOMSTRAND communicates to the *Berichte der Deutschen Chemischen Gesellschaft zu Berlin* a highly philosophical essay, 'On the Combination Value (*Verbindungsverthe*) of the Chemical Elements.' This journal—No. 12, for 1871—contains several papers which are valuable contributions to chemical science.

M. BECQUEREL, Sen., has been directing his attention to the decolorization of flowers and leaves by electrical discharges. The results,—many of them exceedingly curious, were verbally communicated to the Académie des Sciences, on the 31st of July.

A MAGNETO-ELECTRIC machine has recently been produced by M. Gramme, electrical engineer, of Paris, which converts motion into a continuous electrical current, with remarkable facility. The power of this machine is stated to be very great; but as yet we know nothing of the cost at which it is produced.

## FINE ARTS

DUDLEY GALLERY, Egyptian Hall, Piccadilly.—GRAND EXHIBITION OF PICTURES by the celebrated Masters, Correggio, Titian, Tintoretto, Paul Veronese, and many others. Open daily from 10 A.M. to 6 P.M.

R. F. McNAIR, Secretary and Manager.

EXHIBITION OF SPIRIT DRAWINGS IN WATER COLOURS, by Miss Houghton, New British Gallery, 30, Old Bond Street, Piccadilly. OPEN daily from 10 A.M. till 6 P.M.—Admission, One Shilling; Catalogue, One Shilling.

GUSTAVE DORÉ—DORÉ GALLERY, 35, New Bond Street.—EXHIBITION OF PICTURES, including 'Christian Martyrs,' 'Martyrdom,' 'Triumph of Christianity,' 'Francesca de Rimini,' at the New Gallery.—OPEN from Ten till Six.—Admission, 1s.

A *Rudimentary Manual of Architecture; being a History and Explanation of the Principal Styles of European Architecture*. By Thomas Mitchell. Illustrated. (Longmans & Co.)

THIS handy little volume gives a tolerably complete account of the leading and distinctive features and characteristics of the modes of architectural Art in Europe in the Antique, Mediæval, Renaissance and Modern periods. Mr. Mitchell tells us that the sources from which he has drawn his materials are the most serviceable works of recent authors; and it is evident that he has availed himself of those publications very carefully, and that his book cannot but be useful to beginners. He writes clearly, analyzes well, and maintains his hold on the thread of his subjects. His taste is refined, and enables him to discriminate between that which is vicious and that which is admirable. The larger portion of the work is devoted to the Pointed Styles as they obtained in the practice of Mediæval Europe; and he is fully competent, by education and feeling,

to treat of them. There is little to be desired for the improvement of this work as a strictly rudimentary manual; we are inclined to regret that the author does not confine himself to the simplest forms of architectural nomenclature, but disturbs the popular acception of Rickman's system of naming the English Styles; although Early English, Decorated and Perpendicular may not be exactly perfect descriptive terms for the sub-divisions which Rickman devised, yet it is undeniable that they are sufficient for tyros. Mr. Petit's "Early Complete Gothic" and "Late Complete Gothic" are cumbersome and not wholly apt designations; and they require, as Mr. Mitchell states, the use of further sub-divisions and qualifying terms, all of which are apt to confuse the beginner in architectural studies. Such terms as "Flowing Curvilinear Decorated" and "Rectilinear Continuous" are really uncouth, and add little to a student's power of discriminating between those modes of design which Rickman concisely named "Decorated" and "Perpendicular." Besides, the old terms are almost universally accepted in this country, and have been widely, if not in their original sense, adopted on the Continent. The sections on Renaissance design and that which is commonly called Modern, are particularly serviceable, and comprise much excellent criticism. Recent designs, such as those of the great works in Paris, are examined, and their defects and bad taste are pointed out. The book concludes with a useful glossary. The illustrations, which are very numerous, are neatly executed, and well adapted to their purpose.

## MUSIC

BEETHOVEN CENTENARY AT BONN.

THE immortal Beethoven, in the town of Bonn, on the 17th of December, 1770, was born, in the street named after the town (Bonn-Gasse). On the 10th, 11th, 12th, and 13th of August, 1845, a musical festival was held at Bonn, to celebrate the inauguration of the bronze statue of Beethoven, by Hähnel, in the Münster-Platz. On the 20th, 21st and 22nd of August, 1871, there will be another great gathering at Bonn—a "Grosses Musikfest"—to do honour to the great Tone-Poet. This fête was to have taken place last year at the period of the hundredth birthday of Beethoven, but owing to the war, the celebration was postponed. Peace having been proclaimed, and Krupp's great guns being silent, the glorious strains of Beethoven are to be heard again in another festival in his "Vaterstadt." More than a quarter of a century has elapsed since the statue ceremonial, and it will be curious to compare the present with the past. Will the centenary be as much honoured as the "Monument" inauguration? Has there been progress in execution?—for the works of the composer are in 1871 what they were in 1845—undying and unapproachable. In the last-mentioned year, on the first day (Sunday) there was the general rehearsal, a Serenade in the great Square, and in the evening the first concert, after which there were fireworks on the Rhine. On the second day (August 11th, 1845) a new steamboat was baptized "Beethoven," and there was an excursion to Nonnenwerth, and in the evening a "Volks' Ball." The grand day was the 12th: again a Serenade in the Square at seven, A.M.; at eight a procession to the Cathedral, with the performance of Beethoven's Mass in c major, No. 1; at eleven o'clock, on the "Münster-Platz," the Statue was inaugurated; at 4 P.M. a grand concert in the Beethoven Hall; another Serenade at eight P.M., and Bonn was illuminated. On Wednesday (13th August, 1845) was the "Küntzler" (Artists') concert, and a banquet in a vast saloon, erected for the occasion by the late Herr Schmidt, the proprietor of the Golden Star. There was also the torch-light fête at the Palace of Brühl, where the late King of Prussia received Queen Victoria and the late Prince Consort, who were present at the uncovering of the statue. The conductors at the festival were the late Spohr, the late Prof. Breidenstein

and Dr. Liszt. The principal singers were Mesdames Tüschek, Schloss, Kratky and Sachs, Herr Mantius and Herr Staudigl. The Mass in d and the Ninth Symphony (Choral) were the prominent pieces. Dr. Liszt performed a Pianoforte Concerto of Beethoven, and Madame Pleyel Weber's Concert-stück. Perhaps the most memorable musical effects were the works executed by several Prussian military bands, to serenade the "Queen," under the direction of the late Meyerbeer; the selections from his 'Camp of Silesia' ('Etoile du Nord'), and Mendelssohn's 'Midsummer Night's Dream.' The Wedding March, played by several hundreds of wood, brass, and percussion instruments, will not easily be forgotten. Through the late Earl of Westmoreland, the late King of Prussia invited the English literary celebrities who were at Bonn to be present at Brühl. It must be remembered that this Beethoven manifestation arose mainly from the interest taken in the composer by the Earl (founder of the Royal Academy of Music), who organized a concert at Drury Lane Theatre in aid of the funds for the statue. Dr. Liszt paid the deficiency—a large one—in the outlay for the Bonn Festival.

It has been so much the custom to misrepresent the facts connected with Beethoven's career, that it cannot be too often repeated that he was not neglected whilst living: he met with support and honours of all kinds in Vienna, where he died in 1827. There was really no occasion for his application, through the late Sir George Smart and Herr Moscheles, to the Philharmonic Society for aid; for over 1,000*l.* was found in his desk after death. Poverty with Beethoven was a monomania.

Returning to the 1845 meeting, let us record a few names of visitors on that memorable occasion: the Queen of England, the late Prince Consort, the late Earl of Westmoreland (Minister at Berlin), the late Hon. Julian Fane, his son, Meyerbeer, Spohr, Chelard, Dr. Ganz, Rellstab, Dr. Guhr, of Frankfurt, Lindpaintner, Schindler (the friend and biographer of Beethoven), Fétis (Principal of the Brussels Conservatoire), Berlioz, Moscheles, and Sir George Smart. Mdlle. Jenny Lind (Madame Goldschmidt) and Madame Viardot were also at Bonn in 1845: it was the year in which these two great artistes were rivals at the Berlin Opera-House. There were mistakes and mishaps in 1845; but if there be as few in 1871, there will be little provocation for adverse criticism. Herr Professor Wolff, of Jena, no longer lives to write another ode,—"Beethoven lebe hoch!" "Die Künstler leben hoch!" Who will replace Herr Wilhelm Smets in the 'Männerchor,' the music of which was composed by Prof. Breidenstein, "Du Meister best's, der Töne hort"?

The programme of the doings for 1871 is confined simply to the mention of the selected works for execution. These comprise, for Sunday, the 20th of August, the 'Missa Solennis' in d, and the Symphony in c minor, No. 5, Op. 67. On the 21st inst, the 'Leonora' Overture (No. 3), the air from 'Fidelio,' 'Abscheulicher,' the 'Eroica' Symphony (e flat, Op. 55, No. 3), the March and Chorus from the 'Ruins of Athens' (Op. 114), the Violin Concerto, and the Pianoforte Fantasia, chorus and orchestra. On the 22nd (Tuesday, the last day), the 'Coriolanus' Overture, in c minor (Op. 62), the 'Elegischer Gesang' (for four solo voices), the air 'Ah! Perfido,' the 'Egmont' Overture (Op. 84), and the Ninth (Choral) Symphony (Op. 125). We recommend the directors of all our musical institutions, associations, and festivals, and of all concert-givers, to profit by the example of German musicians, and to keep the schemes of performances within reasonable limits. The conductors of the forthcoming festival are Dr. Ferdinand Hiller, of Cologne, and Herr von Wasielewski, one of Bonn's local professors. The chief singers will be Frau Emilie Bellingrath-Wagner, of Dresden, soprano; Frau Amalie Joachim, of Berlin, contralto (wife of the violinist); Fraulein Franziska Schreck, of Bonn, contralto; Herr Vogl, of Munich, tenor; Herr A. Schultze, of Hamburg, basso. The solo instrumentalists will be Herr

Joachim (violin), of Berlin; Herr Halle, of Manchester (pianist); and Herr Franz Weber, of Cologne (organist).

The concerts will all be given in the new Beethoven Hall—a permanent edifice, erected for general purposes, which has apparently been lately used for a national manifestation, as the banners of the chief Rhenish towns and the bust of the Emperor of Germany are exhibited. The plaster effigy of his Imperial Majesty is placed just under the narrow gallery to the organ. Below the royal bust is the bronze one of Beethoven, more ideal in its facial expression than the stern, uncompromising features of Hähnel's statue. Beethoven, with pencil and note-book in his hands, looks as if he was denouncing the musical execution in the Minster. The Hall may be good for sound, but the arrangement of audience and executants on an almost flat surface does not look promising. There are two side galleries to the Hall, which is ventilated by windows placed after the same fashion as those of a gallery for paintings. The orchestra, at all events, ought to have been on an inclined plane. There will be four rehearsals for the performances, the first of which was on the 18th inst. (Friday). From the Hall to the Bonn-Gasse it is but a short distance by the river bank, just where the steamers from Holland land their passengers. The Bonn-Gasse is one of the narrowest and dirtiest streets in Bonn. About half-a-dozen houses up the street, going from the Rhine, a dilapidated building is seen, over the entrance to which is a stone slab, on which the letters have been cut out:—"L. VAN BEETHOVEN GEBURTHAUS." The persons occupying the ground-floor seem surprised when a stranger asks to see the room in which Beethoven was born. On ascending to the second floor by a broken-down staircase, there is a suite of four rooms, which were occupied by Johann Beethoven and his family. In the parish church of St. Remigius is the register of his marriage with a widow, Maria Magdalena, daughter of the chief cook of the fort of Ehrenbreitstein, the husband, Johann, being a tenor-singer in the Electoral Chapel. The room in which Beethoven was born is now occupied by a cobbler, Max Schratzenholz, who, whilst hammering soles, has sympathies beyond his last, and will discourse musical reminiscences of the musician who first drew breath in the opposite corner of the room in which he sits at his stall. It is a miserable chamber, to which light is alone admitted by two narrow casements, from which a dirty yard with ruined buildings in the rear can be seen! Why do not the Germans purchase the house in the Bonn-Gasse, as we have done the cottage at Stratford-on-Avon, where Shakespeare was born? Beethoven's house should be preserved as a national relic.

### DRAMA

*The Stage of 1871: a Review of Plays and Players.* By Hawk's-Eye. First Series. (Bickers & Son.)

ON casually opening this book (p. 5) we find Hawk's-Eye praising Mr. Phelps's "Billy Bottom," and taking the "Man of the World" as if it were written to support rather than satirize vice. Treating of audiences, he says, with simplicity, "I declare I have noticed persons bursting with laughter at the most pathetic parts, when, if anything, they ought to have cried!" Those persons, probably, had excellent reasons for laughing,—as Sheridan did at Cumberland's serious pieces. Mrs. Bancroft's "greatest gift," the author tells us (p. 30), "is the extraordinary power she possesses of changing her voice." At page 58, he says of the voices of Mr. Phelps and Mr. and Mrs. Bancroft, "Blindfold, you could never make a mistake in recognizing them by their voice, in any character, or anywhere." Of Mr. Sothorn, Hawk's Eye thinks the dreary Lord Dundreary

a fine performance, but adds, that "it has undoubtedly overshadowed the other parts that he has appeared in, nor has he had a part to do full scope to his abilities." This is incorrect. Dr. Marston and others have written parts for him which any actor might be proud to play, and Mr. Sothorn played them to the best of his ability, but none has lived. His Garrick is something woeful to think of, when we remember how it was dressed. Farren would have made it like a portrait of the original walking out of a frame. The worst sign of Mr. Sothorn's want of progress is seen in his falling back on screaming farce. It is to be regretted that Dundreary should overshadow an actor who is to be respected for his earnestness. His desire is always to do well, and that is no small means towards a coveted end. The author is quite right when he says, "emotion is not Mr. Sothorn's special forte." To our mind, no man makes love on the stage so poorly. It is not his bearing that is in fault, but his voice, which is harsh and unmusical. Even this obstacle he occasionally surmounts, and he has given promise enough of becoming a fully accomplished actor, but what encouragement has a player to become so, when he receives as much applause for Dundreary as if he had acted Hamlet, after years of study, better than any other actor of his time? It is a pity that the public should have their spoilt children of the stage. We cannot say much in praise of Hawk's-Eye. Even where he has right on his side, he gives to it weak expression; but it is something to be right, though it be poorly expressed.

### Dramatic Gossip.

THE Charing Cross Theatre re-opened on Monday, with a performance of Sir Charles Young's drama of "Shadows," originally produced at a morning representation at the Princess's Theatre, of a new farce, by Mr. Strachan, entitled "Our War Correspondent," and a comedietta, by Mr. C. M. Rae, "My Villa in Italy."

THE Opéra Comique will shortly re-open its doors.

MADAME FARGUEIL's return to the Vaudeville has taken place, in the part of Cécile, in "Nos Intimes." The cast of the piece is the same, so far as the principal characters are concerned, as that with which it was recently given in London.

M. DUMAS, FILS, announces that the removal of his father's remains and the funeral service originally fixed for the 24th of last month will not take place until the evacuation by the Prussians of the Department of the Aisne, in which the last resting-place of the author of "Monte Christo" is fixed.

M. DUFOIS and Mdle. Deveria will play the principal rôles in the new opéra-bouffe of MM. Crémieux, Jaime, and Hervé, "Le Trône d'Écosse."

MADAME LÉONIDE LEBLANC has been engaged at the Gaité to play the rôle of Blanche de Nevers, in "Le Bossu."

"LES CAPONS," a three-act comedy of M. Touroude, is in rehearsal at the Folies-Marigny. This piece will probably be followed by a new version of "Mazeppa."

THE opening of the Folies-Nouvelles is fixed for the 25th of August. A vaudeville, entitled "Un Mari à Tiroirs," is the only novelty of the programme.

THE panic concerning Prussian spies characteristic of Frenchmen during the late war forms the subject of a farce, by M. L. Félix Savard, produced at the Folies-Marigny, entitled "L'Espion de la Rue Cadet." A panic-stricken bourgeois sees in a new servant a Bavarian colonel in disguise,

and is not cured of his fears until some comic situations have been obtained.

TWO one-act novelties have been produced at the Vaudeville, "L'Aile du Corbeau," by MM. Garraud and Thomas, and "La Ressemblance," by MM. Leterrier and Vanloo. The piece first named was successful, the second a failure.

"DIE KAISERGLÖCKE VON SPEIER," a new drama, by Herr Arthur Müller, is to be produced at the Munich Hoftheater. The subject of the drama is the struggle of Henry the Fourth against the Papal supremacy. An historical play, "Der Verhängnisvolle Feldwebel," produced for the first time in Vienna, met with moderate success.

AT the Hoftheater of Dresden, a piece written in celebration of the victorious return of the German armies, by Herr Julius Rodenberg, entitled "Vom Rhein zur Elbe," with music by Herr Karl Krebs, was performed with great success in the presence of the Court and a crowded house.

THE death is announced, from Brussels, of M. Deaddé Saint-Yves, who, besides upwards of 130 pieces which he wrote for the stage, and which were performed in the Belgian theatres, published more than forty volumes of historical romances, written by himself and M. Octave Féry.

ON the occasion of the seventieth anniversary of Herr Karl Egon Ebert's birthday, a performance of his early dramatic work, "Bretislav und Jutta," was given in his honour, at the Neustädtertheater of Prague.

IN the Arena of Buda an operetta in the French style, "Dunois der Schöne Ritter," has been successfully performed.

IN Genoa, at the Peschiere, Signor Bersezio's comedy, entitled "Da Galeotto a Marinaro," has been received with much favour, the author and the actors being repeatedly called before the curtain. For the benefit of Signor Bellotti-Bon, two new pieces, "Perchè al Cavallo gli si guarda in Bocca," by Signor Leopoldo Marengo, and Signor Ferrari's "Nessuno va al Campo," were given, with great success.

A WELL-WRITTEN adaptation of the ancient Indian drama "Sakuntala," written by Alfred von Wolzogen, has been very well received at the Weimar Hoftheater.

A CONTRIBUTION towards the history of the German Theatre has been written by Herr Heinrich Laube, entitled "Das Burgtheater," and published at Leipzig.

A YOUNG Italian actress, Signorina Casati, who has been performing at Asti, in the spirited little piece, "La Bambola di Madamizella Teresa," is very well spoken of by the Italian dramatic papers.

### ANTIQUARIAN NOTES.

A *Lost European City*.—I note the following verbal resemblances, which, whether real or fanciful, may add interest to Mr. Lebour's communication on this subject. *Is*, the lost city, was surrounded by dykes, and eventually submerged; *Is*, in Welsh, is "low, under, inferior." In Landévenec, do we not see the Welsh *llan*, a sacred enclosure, as in Llandaff, &c.? Conan the prince, a favourite historic name with Bretons, is "wisdom, knowledge;" Anglied, *cunning*. St. Gwénolé is "the white lady." King Gradlon is *gradale*, whence the holy grail. In Douarnenez, we have the Celtic *dwr*=water. Now, taking *Is* as=low, it would be a proper prefix for a *Netherlandish* people, the inhabitants of a sort of old English Holland; does not this give us the (I) Silures, i.e. *Is-sylvian*, Latinized?—meaning, the dark inhabitants of the low-lands of the Severn, in Roman times. If the dark Iberic Basques reached Britain, it was *vid* Armorica to the Severn, wherever they may afterwards have straggled to.

A. H.

TO CORRESPONDENTS.—T. M.—P. W. S. M.—A. H.—received.



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I remain truly yours,

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6, St. Mary Abbott's-terrace, Kensington, W.

From CHARLES HALLE, Esq.

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From GEORGE PRIOR, Esq., Mus. Bac. Oxon.

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Organist and Choir-Master, Cathedral, Peterborough.

From LINDLEY NUNN, Esq., Mus. Bac. Cantab.

SIR,—Having used several of your Digitoria, I find them a most valuable aid in overcoming the mechanical difficulties of Pianoforte-playing.

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